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AN ASSESSMENT OF RIPARIAN AND UPLAND CONDITIONS ON GRAZING ALLOTMENTS AT LAKE ROOSEVELT NATIONAL RECREATION AREA, WASHINGTON

by
Joel Wagner, Pete Biggam, Michael Martin, and Ben Bobowski

Technical Report NPS/NRWRD/NRTR-2005/329

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by
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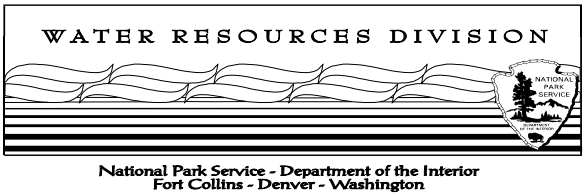

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INTRODUCTION

In 2004, LARO requested assistance from the NPS Natural Resource Program Center (NRPC) to perform an independent assessment of riparian and upland resource conditions on four grazing allotments in the Spring Canyon and Kettle Falls Districts. An interdisciplinary team consisting of a soil scientist, a hydrologist, and a wetland scientist from the NRPC, a rangeland management specialist from Grant-Kohrs Ranch National Historical Site, and a vegetation specialist from the Natural Resources Conservation Service visited the park in June, 2004 to perform these assessments. The assessment areas in the Spring Canyon District were on the Rosenberg and Green grazing allotments. In the Kettle Falls District, the Henslee and Eckman allotments were assessed.

The team evaluated a total of four riparian sites using the "Proper Functioning Condition" (PFC) riparian assessment method developed by the Bureau of Land Management (USDI-BLM 1998). The PFC method uses an interdisciplinary team to evaluate 17 hydrology, vegetation, and stream geomorphology indicators of riparian condition or "health." Based on these evaluations, the team assigns one of three possible assessment ratings: "Proper Functioning Condition," "Functional At-Risk" or "Nonfunctional."

Four upland areas were assessed using the "Interpreting Indicators of Rangeland Health" assessment method, also developed by the Bureau of Land Management (BLM). This technique uses an interdisciplinary approach to assess the health of rangelands by evaluating soils, hydrology, plant communities, and other appropriate ecological information. The product of this assessment is not a single rating of rangeland health, but an assessment of three landscape attributes; Soil/Site Stability, Hydrologic Function, and Integrity of the Biotic Community.

The team did not develop a formal rating for riparian or upland conditions on the Henslee Allotment because the "Proper Functioning Condition" method for riparian areas and the "Interpreting Indicators of Rangeland Health" method are not designed to evaluate the land cover types present (forested upland and pastureland). However, we did perform a wetland delineation study in the southern portion of the allotment, as requested by LARO staff.

The NRPC team evaluated present conditions of the resources and projected resource condition trends using published methods and general observations (procedures are explained in following sections). While these methods are not

designed to identify the specific causes of resource problems encountered, the team provides some management recommendations in this report that would improve conditions for several of the sites.

PROCESS FOR ASSESSING "PROPER FUNCTIONING CONDITION" OF RIPARIAN AREAS

Based on a review of available riparian functional condition assessment methods, the team chose to apply the BLM's "Proper Functioning Condition" method for the LARO riparian assessments. Documentation for the PFC method can be found in "A User Guide to Assessing Proper Functioning Condition and the Supporting Science for Lotic Areas" (USDI – BLM, 1998).

The PFC technique uses an interdisciplinary team of subject matter experts (botany, fluvial geomorphology, hydrology, riparian-wetland science) to assess the "functional condition" of riparian systems according to 17 hydrology, vegetation, and stream geomorphology factors. The "proper functioning condition" of a riparian area refers to the stability of the physical system, which in turn is dictated by the interaction of geology, soil, water, and vegetation. A properly functioning riparian area is in dynamic equilibrium with its streamflow forces and channel processes. The channel adjusts in slope and form to handle larger runoff events with limited perturbation of channel characteristics and associated riparian-wetland plant communities. Because of this stability, properly functioning riparian areas can maintain fish and wildlife habitat, water quality enhancement, and other important ecosystem functions even after larger storms. In contrast, nonfunctional systems subjected to the same storms might exhibit excessive erosion and sediment loading, loss of fish habitat, loss of associated wetland habitat, and so on.

Based on assessments of the hydrologic, vegetative, and geomorphology elements of the riparian area, the interdisciplinary team assigns one of the following three functionality ratings to a site:

Proper Functioning Condition (PFC): Streams and associated riparian areas are functioning properly when adequate vegetation, landform, or large woody debris is present to:

1. Dissipate stream energy associated with high waterflows, thereby reducing erosion and improving water quality;

2. filter sediment, capture bedload, and aid floodplain development;
3. improve floodwater retention and groundwater recharge;
4. develop root masses that stabilize stream banks against cutting action;
5. develop diverse ponding and channel characteristics to provide habitat and the water depths, durations, temperature regimes, and substrates necessary for fish production, waterfowl breeding, and other uses; and
6. support greater biodiversity.

Functional-At Risk: These riparian areas are in functional condition, but an existing soil, water, vegetation, or related attribute makes them susceptible to degradation. For example, a stream reach may exhibit attributes of a properly functioning riparian system, but it may be poised to suffer severe erosion during a large storm in the future due to likely migration of a headcut or increased runoff associated with recent urbanization in the watershed. When this rating is assigned to a stream reach, then its "trend" toward or away from PFC is assessed.

Nonfunctional: These are riparian areas that clearly are not providing adequate vegetation, landform, or large woody debris to dissipate stream energy associated with high flows, and thus are not reducing erosion, improving water quality, sustaining desirable channel and riparian habitat characteristics, and so on as described in the PFC definition. The absence of certain physical attributes such as a floodplain where one should exist is an indicator of nonfunctioning conditions.

Proper Functioning Condition assessment does not refer to the successional stage of the riparian-wetland vegetation community. Rather, the evaluation is based on the concept that in order to manage for such things as potential natural vegetation communities or desired fish and wildlife habitat features, the basic elements of physical stability (e.g., energy dissipation and streambank stabilization) must first be in place and functioning properly. For example, a vegetation community recovering from a recent fire may be in an early successional stage due to loss of trees and shrubs, but that stage may still provide sufficient physical stability for the riparian area to accommodate flood flows without significant erosion and channel change. That geomorphically stable and "properly functioning" condition then allows for recovery of the desired features of later successional systems such as in-channel woody debris that creates desired fish habitat or riparian tree and shrub layers that provide diverse bird habitats.

During this site visit, the team assessed riparian functional condition on streams within the Rosenberg, Green, and Eckman grazing allotments within LARO. The stream reach assessments are discussed individually below, and each assessment is supported by a detailed PFC assessment form in Appendix 1.

PROCESS FOR "INTERPRETING INDICATORS OF RANGELAND HEALTH"

To evaluate the condition of the upland areas in the selected grazing allotments, we utilized qualitative assessment methods co-developed by the Natural Resources Conservation Service, Agricultural Research Service, the Bureau of Land Management, and the United States Geological Survey. These methods are described in the publication "Interpreting Indicators of Rangeland Health" (Pellant et al., 2000).

This assessment tool is designed to provide a preliminary evaluation of soil/site stability, hydrologic function, and integrity of the biotic community at the ecological site level. It is designed to assist land managers in identifying areas that are potentially at risk of degradation, and can help in the selection of sites for development of a future monitoring program. However, this tool is not designed to identify the specific causes of resource problems, or make grazing or other management decisions.

This technique uses an interdisciplinary approach to assess the health of rangelands following a multiple step process to address ecological processes occurring at the site. It involves the use of soil survey information, ecological site descriptions, and appropriate ecological reference areas.

The product of this qualitative assessment is not a single rating of rangeland health, but an assessment of three landscape attributes; Soil/Site Stability, Hydrologic Function, and Integrity of the Biotic Community. Definitions of these three closely interrelated attributes are:

Soil Site Stability: The capacity of the site to limit redistribution and loss of soil resources (including nutrients and organic matter) by wind and water.

Hydrologic Function: The capacity of the site to capture, store, and safely release water from rainfall, run-on (inflow), and snowmelt (where relevant), to resist a reduction in this capacity, and to recover this capacity following degradation.

Integrity of the Biotic Community: The capacity of the site to support characteristic functional and structural communities in the context of normal variability, to resist loss of this function and structure due to disturbance, and to recover following disturbance.

As part of the assessment process, 17 indicators relating to these attributes are evaluated, and the category descriptor or narrative that most closely describes the site is recorded. "Optional Indicators" may also be developed to meet local needs. The critical link between observations of indicators and determining the degree of departure from the ecological site description and/or ecological reference area is the interpretation process.

This process will not provide for just one rating of rangeland health, but based upon a "preponderance of evidence" approach, it will provide the three attribute's departure from the ecological site description/ecological reference area(s). There are 5 categories of departure recognized, which include "none to slight", "slight to moderate," "moderate," "moderate to extreme," and "extreme." Areas of interest with "moderate" to "extreme" ratings may stimulate other actions (e.g., a review of existing inventory or monitoring efforts, or communication with other groups or agencies involved in the management of the area) to then determine the causes of the problems.

RESULTS OF RIPARIAN ASSESSMENTS

1. Rosenberg/Neal Road Allotment – Unnamed Stream

PFC assessment reaches are chosen based on similarity in valley and channel characteristics, land use, and other factors. In this case, a waterfall represents a significant break in channel type (bedrock bottom above the waterfall vs. alluvium below). Therefore, separate assessments were performed for stream reaches above and below the waterfall (Figure 1).

Reach #1 (above waterfall)

This reach is characterized by a narrow, relatively straight, V-shaped, bedrock-controlled channel. The team determined that the low sinuosity, low width-depth ratio, and moderately-steep channel gradient are appropriate to and in balance with the relatively steep valley gradient (approximately 4%). Unlike lower-gradient streams that use floodplain morphology to dissipate energy from high flows, this channel type dissipates flood energy largely through step-pool channel morphology. In this case, exposed bedrock on the channel bottom and lower banks provides exceptional vertical stability. This channel doesn't appear to be subjected to high flows very often (no evidence of flood flows such as flood debris or bank scour), which may be related to very high infiltration rates in the watershed and small watershed area.

Black cottonwood (*Populus trichocarpa*), mountain alder (*Alnus incana*), serviceberry (*Amelanchier alnifolia*), and wood rose (*Rosa woodsii*) are the dominants in a diverse riparian tree/shrub community. All of these native species provide very dense cover and have root masses capable of withstanding high stream flow events (protection against erosion of stream banks). Cottonwoods are "replacement age" and older with no recent recruitment, and willows are completely absent from the reach. This is not that surprising, since recruitment of willows and cottonwoods is dependent on presence of moist, bare mineral substrates such as might be created on floodplains after snowmelt or spring storms. In this V-shaped, densely vegetated channel, such conditions could only occur after major disturbances such as fire or very large floods with sufficient energy to uproot existing vegetation. Therefore, new recruitment of willows and cottonwoods is expected to be an infrequent event in this watershed that apparently does not experience large flood flows very often.

Lack of willows may be significant from a wildlife habitat perspective (e.g., certain bird species may be associated with willows), but is not a significant issue with respect to channel stability due to bedrock control and an abundance of other bank-stabilizing woody species. Herbaceous vegetation in the understory is very limited due to the dense tree/shrub canopy that limits light penetration, but this is also not seen as a destabilizing factor for the same reasons.

The team rated this stream reach as being in **Proper Functioning Condition** based on vegetation and geologic characteristics that provide ample ability to withstand moderate to large flood flows without undue erosion or loss of habitat structure (see PFC checklist and notes in Appendix 1). Cattle trailing near the

banks and at occasional stream access points has led to localized bank instability and increased sediment loading, but this is not seen as a significant overall destabilizing factor (i.e., site is not "at-risk").

Management recommendations: Current livestock management appears to be compatible with maintenance of a "properly functioning" riparian system in this reach. If practical, we recommend that measures be taken to discourage livestock from trailing along the edge of the channel to avoid destabilization by hoof action (a source of sediment inputs) and direct input of nutrients from defecation.

It is unlikely that livestock trailing impacts could be completely remedied without total removal of livestock. The canyon is relatively narrow in many locations and livestock prefer to follow the flatter canyon bottom terrain. However, there are several management techniques that can assist in largely mitigating the concern. Where appropriate, some of the ideas can be captured in a permit; others will require work with the permittee:

1. Modification of livestock behavior through:
    a. Culling – typically one lead cow will take the herd to water. Culling the lead animal(s) in favor of those animals that behave differently is often successful for a few generations of livestock.
    b. Riding – having a required rider for the allotment will often assist in 'training' the stock to avoid certain areas.
    c. Supplements – the addition of a supplement (not just salt, although that can help) will aid in changing the distribution of livestock.
    d. Season of use – livestock need more water in warmer temperatures, and the evidence suggests that livestock impacts near water can be minimized by stocking the area in the cooler times of year. If it warms up, a rider could assist with the distribution of the livestock.

2. Make water accessible in other locations:
    a. The stream corridor is heavily vegetated in most areas, which prohibits livestock access. It is worth considering creating an access point for watering further upstream to encourage the animals to stay higher in the watershed rather than trailing down along the full length of the riparian zone for water each day. Access areas do not have to be large; there might be open areas that already exist and the animals just need to be trained to use them.

b. Concerns about nutrient management (defecation into or very close to the stream) can be mitigated by restricting livestock use during active growing seasons (typically April through September but it would be good to consult with local experts). Note: although this would mitigate impacts on the stream/riparian ecology, nutrients would still be delivered to the lake.

Reach #2 (below waterfall to road crossing)

Like Reach #1, this stream reach is characterized by a narrow, relatively straight, V-shaped channel (Figure 2). The difference is that the bottom and lower banks of this channel are formed in alluvial material rather than bedrock. The team determined that the low sinuosity, low width-depth ratio, and moderately-steep channel gradient are appropriate to and in balance with the relatively steep valley gradient (approximately 4%). This channel type dissipates flood energy largely through step-pool channel morphology. However, unlike Reach #1, it is not protected from vertical incision (downcutting) by bedrock, and must rely more on channel vegetation for vertical stability. This channel doesn't appear to be subjected to high flows very often (no evidence of flood flows such as flood debris or bank scour), which may be related to very high infiltration rates in the watershed and small watershed area.

Red-osier dogwood (*Cornus stolonifera*), mock orange (*Philadelphus lewisii*), and wood rose are the dominants in this dense riparian tree/shrub community. Cottonwoods are sparse and willows are absent, though this is not surprising for the same reasons described above under Reach #1. Red-osier dogwood, wood rose, and other woody riparian species present are providing extensive cover and have root masses capable of withstanding high stream flow events (protection against erosion of stream banks). The concern for this stream reach is that there is very little herbaceous cover near and in the stream channel due to the dense overstory. The herbaceous vegetation component is not playing a discernible role in bank or channel stability, leaving the unprotected alluvial channel bottom susceptible to erosion and incision.

Cattle trailing near the banks (Figure 3) and at occasional stream access points has led to localized bank instability and increased sediment loading, but this is not seen as a significant overall destabilizing factor.

The team rated this stream reach as **Functional – At Risk** due to the steep alluvial channel that dissipates energy via bed-step form, but is without bedrock, large boulders, or a strong herbaceous vegetation component to help protect against channel incision (see PFC Checklist and notes in Appendix 1). We cannot quantify the level of risk for channel incision during a large flood without extensive hydrologic analysis. This risk is inherent in this channel type, and no management actions are warranted to address this issue.

Management recommendations: Current livestock management appears to be compatible with maintenance of a functional riparian system in this reach. If practical, we recommend that measures be taken to discourage livestock from trailing along the edge of the channel to avoid destabilization by hoof action (a source of sediment inputs) and direct input of nutrients from defecation. Please see Reach #1 "Management recommendations" above for specific livestock recommendations.

2. Green Allotment – Kaufman Canyon

For this allotment we assessed a stream reach extending from the lakeshore to a point approximately 200 feet south of the Green property line (Figure 1). Unlike the V-shaped channel in the steeper-graded Rosenberg sites, this alluvial channel has an associated floodplain that supports a dense riparian vegetation community (Figures 4 and 5). Channel sinuosity, bed steps, and a well-vegetated floodplain combine to disperse the energy from flood flows and minimize erosion (no significant channel incision or lateral migration were observed). The width/depth ratio, sinuosity, and channel/floodplain form are all appropriate to the approximately 2% valley grade. This channel doesn't appear to be subjected to high flows very often (no evidence of flood flows such as flood debris or bank scour), which may be related to very high infiltration rates in the watershed and small watershed area (same upland soil group as at the Rosenberg site).

Black cottonwood, sandbar willow (*Salix exigua*), whiplash willow (*Salix lasiandra*), a third willow species (most likely *Salix lutea*), wood rose, and serviceberry are the dominants in a diverse riparian tree/shrub community. All showed substantial reproduction and replacement age classes in most areas. Herbaceous communities (Figure 5) were dominated in various areas by monkey flower (*Mimulus* sp.), speedwell (*Veronica* sp.), *Polygonum* sp., sedges (*Carex* spp. - at least 2 species, not in flower) and rush (*Juncus* sp.). These woody and herbaceous riparian-wetland species provide dense cover and have root masses

capable of withstanding larger stream flow events (protection against erosion of stream banks and channel bottoms). We did observe a couple of areas of slight channel incision where bluegrass and sage were encroaching on the channel banks. However, these were very small areas and are not a threat to the stability of the system.

The team rated this stream reach as being in **Proper Functioning Condition** based on a channel-floodplain form and a healthy riparian wetland vegetation community that provide ample ability to withstand moderate to large floods without undue erosion or loss of habitat structure (see PFC checklist and notes in Appendix 1). However, we note that channel stability in this moderate-grade alluvial system is highly dependent upon continued maintenance of the current healthy riparian-wetland vegetation community. The site could become "At-Risk" if additional grazing pressure began to degrade these vegetation characteristics.

Management recommendations: Current livestock management appears to be compatible with maintenance of a functional riparian system in this reach. We recommend that the park maintain the current level of vegetation community health by not extending grazing any further into the growing season than current management allows.

3. Eckman Allotment – Unnamed stream flowing from the impounded wetland and terminating at the lakeshore sand spit

We assessed the lowest portion of this stream, a reach extending 250 feet upstream from the lake shore (Figure 6). The channel is incised approximately 8-10 feet deep near the shoreline (Figures 7a and b), and an active headcut extends approximately 200 feet upstream. In this unstable reach, stream energy is dissipated through channel incision and bank erosion, resulting in a narrow, steep-walled channel with no floodplain. The banks are continuously failing and adding excess sediment to the channel and to the lake. This process appears to be exacerbated by cattle hoof action. If unchecked, the headcut has the potential to degrade much more riparian-wetland habitat upstream and to continue delivering excess sediment to Lake Roosevelt.

Large lake level fluctuations and cattle grazing may have had roles in causing the incision problems observed at this site. When lake stage drops significantly due to dam operations, the hydraulic gradient at the mouth of the stream may

increase dramatically and provide the energy needed for channel incision. A healthy riparian-wetland community might be able to protect the channel from incising under these conditions. However, if cattle caused the loss of channel-stabilizing vegetation by grazing and trampling, this could have encouraged headcut formation, with subsequent migration upstream. Such incision can cause willows and herbaceous wetland vegetation to be undercut or to die off due to a lowered water table, and they may not be replaced due to lack of suitable reestablishment areas (incised channel with steep banks) and/or additional grazing and trampling effects.

The limited riparian-wetland plant cover present is restricted to the narrow base flow channel itself, and perhaps 6-12 inches on either side, before the steep banks quickly transition to upland habitat. Willows and other woody riparian species are almost totally absent along this reach, with only a few isolated, very small sandbar willows found on perhaps 5% of the assessment reach. Herbaceous riparian-wetland vegetation is also very poorly developed. A few very scattered sedge (*Carex retrorsa*) and dock (*Rumex* sp.) plants exist, and watercress is found in flowing water, but most of the incised channel banks are either bare or support upland weeds such as smooth brome, Japanese brome, and diffuse knapweed.

The team rated this stream reach as being in **Nonfunctional** condition due to the obvious vertical and lateral channel instability (headcut, channel incision, and bank failure) and lack of stabilizing riparian-wetland vegetation.

Management recommendations: Due to the unstable nature of a headcut in unconsolidated alluvium, it is almost inevitable that this feature will advance further upstream for a considerable distance and destroy additional riparian-wetland habitat. The result will be an incised channel with failing banks that will not support a healthy riparian ecosystem. However, there is still a very good opportunity to stop this process with small-scale structural intervention. We recommend that park staff request assistance from WRD in designing and installing a small diversion structure in the channel above the headcut that would divert flow into a new surface channel toward the south (Figure 8). Back-filling of the incised reach below the structure may also be necessary. This would protect against further loss of riparian-wetland habitat and replace the habitat that has already been lost due to channel incision.

Although herbaceous wetland vegetation should establish in the proposed new channel over time via seeds transported from upstream, we recommend

transplanting locally-derived plugs of rhizomatous rushes, sedges, and other native wetland plant species to jump-start that process and more quickly stabilize the channel. Willow cuttings are also recommended to help stabilize the banks and to improve habitat structure.

We recommend excluding cattle and visitor use from the proposed riparian restoration area for an extended period of time due to the need to let new stabilizing vegetation establish and to help protect the new channel from incision. Establishment of monitoring plots will aid in determining if and when the site is stable enough to withstand pressure from visitors and/or livestock.

A cautionary note: Livestock management in this allotment, particularly this site, has been a dominant source of perturbation. The evidence suggests that livestock have used this area intensively for loafing, water, and intensive feeding. Reintroducing the stock to this site without management adjustments for timing, number, and distribution of livestock will likely result in a new round of degradation for this riparian system.

RESULTS OF WETLAND DETERMINATIONS

Henslee Allotment

One of our objectives at the Henslee Allotment was to examine this riverine terrace landscape for the presence of wetlands. Wetlands are common features on fluvial terraces, with water mainly derived from two sources: the mainstem river and sideslope drainage. The main channel may provide water to these wetlands through overbank floods, or the river may simply create a high enough water table in adjacent terraces that some low areas become sub-irrigated wetlands. Sideslope drainage may provide water to riverine terrace wetlands either through tributary drainage or toe-slope seepage. In some environments, all of these processes may support terrace wetlands. The park's intent for this evaluation was to assure compliance with NPS policy regarding protection of wetlands (NPS Director's Order #77-1: Wetland Protection) as well as compliance with state or federal wetland protection laws and regulations (e.g., Section 404 of the Clean Water Act).

For Section 404 of the Clean Water Act, the U.S. Army Corps of Engineers uses the "Corps of Engineers Wetlands Delineation Manual" (U.S. Army Corps of Engineers, 1987) to delineate wetland habitats. According to this method,

presence of wetland hydrology, hydrophytic vegetation, and hydric soil must all be confirmed for a site to be considered a wetland. (The State of Washington uses an essentially identical method for its wetland regulatory program.) The NPS uses the somewhat broader wetland definition found in the U.S. Fish and Wildlife Service's "Classification of Wetlands and Deepwater Habitats of the United States" (Cowardin et al. 1979). This definition includes all vegetated wetlands as defined by the 1987 Corps Manual, but also defines certain unvegetated and non-soil sites such as stream channels (e.g., the Kettle River), mudflats, shallow ponds, and rocky shorelines as wetlands, as long as they meet certain hydrology criteria.

We were asked to focus our investigation on the southern portion of the allotment - specifically the forested river terrace between the Kettle River and the eastern boundary. The eastern boundary area has some obvious wetlands by the road, as indicated on the USGS 1:24,000 scale topo map (Figure 9), and a formal delineation was not necessary there. After walking the rest of the site, we determined that any other wetlands would be vegetated, and that the 1987 Corps Manual could be used to satisfy NPS wetland procedures as well as state and other federal wetland regulations. The forested portion of the study area is clearly upland habitat, with the possible exception of an abandoned channel or ditch that meanders through the site. We decided to evaluate what appeared to be a low point in the abandoned channel, on the theory that if that location did not qualify as a wetland, then there are no wetlands present within the forested portion of the terrace.

Appendix 2 shows the completed 1987 Corps Manual "Routine Wetland Determination" form for the site we evaluated. The vegetation portion of the form shows that exactly 50% of the dominant plant species from the three represented strata (tree, shrub, and herbaceous) were facultative, facultative wetland, or obligate wetland species. According to the Corps Manual, this figure must exceed 50% to be considered hydrophytic (wetland), so the hydrophytic vegetation criterion was not met. However, since the vegetation is so close to meeting the criterion, more in-depth analysis (including evaluation of non-dominant species) would be warranted if the other two required criteria (hydric soil and wetland hydrology) are met.

The hydrology criterion requires that a site be inundated or saturated to the surface continuously for at least 5% of the growing season (typically longer). The hydrology portion of the delineation form indicates that depth to saturation was 40 inches below the ground surface and the water table was deeper than 40

inches. In this relatively wet part of the growing season, we would expect a wetland habitat to have a water table much closer to the surface. None of the primary or secondary hydrologic indicators were observed at this site. Therefore, the hydrology criterion was not met.

The soil portion of the analysis shows that the site did not exhibit any of the hydric soil indicators listed in the 1987 Manual or in "Field Indicators of Hydric Soils in the United States" (USDA-NRCS 2002). Therefore, the hydric soil criterion was not met.

Based on failure to meet any of the three required wetland criteria, this site was determined to be an upland environment and, therefore, not subject to NPS, state, or federal wetland policies and regulations. By extension, we determined there are no other wetlands within the forested portion of the allotment.

RESULTS OF ASSESSMENTS ON RANGELAND – UPLAND AREAS

1. Rosenberg Allotment

The site for the rangeland assessment was located on a terrace just east and upslope from the riparian site evaluated above the waterfall (Figures 1 and 10). Information from this site can be observed in Appendix 3 – Rangeland Health Evaluation Summary Worksheets.

The soil at the site was confirmed as Ewall loamy sand (soil mapunit 36) from the Lincoln County, Washington, Soil Survey, and was correctly correlated to a *Sandy 9-15 inch precipitation* Ecological Site Description (R008XY501WA). Ewall soils are very deep, excessively drained soils formed in Missoula Flood outwash deposits or dune sand on terraces.

Very little evidence of erosion by water or wind was present, and the amount of plant litter and bare ground was within the range expected for the site. Most of the bare soil was associated with bioturbation from rodents and insects. The presence and distribution of biological soil crusts was also within the range expected for the site.

Present vegetation of the site was Antelope bitterbrush (*Purshia tridentata*) and green rabbitbrush (*Chrysothamnus viscidiflorus*), with scattered Ponderosa pine (*Pinus ponderosa*). The understory consisted of needle-and-thread grass (*Stipa*

comata), bluebunch wheatgrass (*Psedoroegneria spicatum*), with non-native Japanese brome (*Bromus japonicus*) and cheatgrass (*Bromus tectorum*) widely distributed throughout the site.

Evidence of recent livestock grazing was present, but impacts to soil, hydrologic, and biotic resources were minimal.

Assessment Results: Using the preponderance of evidence approach, the team noted a ***none to slight*** departure from the Soil/Site Stability attribute, a ***none to slight*** departure from the Hydrologic Function attribute, and a ***slight to moderate*** departure from the Biotic Integrity attribute, mainly due to the presence of invasive plant species on the site, and a slight decline in functional groups expected for the site.

Management recommendations: Current livestock management appears to be compatible with the Indicators of Rangeland Health. However, there is a risk that livestock use of perennial grasses may enhance the dominance of annual grasses. We recommend that the timing and intensity of grazing be managed to minimize impacts to perennial grasses, particularly bluebunch wheatgrass, which is susceptible to grazing early in its growth. We recommend grazing after the fall regrowth has occurred and before growth begins in the spring or late summer/early fall.

2. Green Allotment

Within the Green Allotment, the team decided to make two observations of rangeland health, on upland areas west and east of the riparian assessment.

Green Allotment – Site 1, West of the Riparian Assessment

The site for this rangeland assessment was located on a fan terrace north and west from the riparian site (Figures 1 and 11). Information from this site can be observed in Appendix 3 – Rangeland Health Evaluation Summary Worksheets.

The soil at the site was confirmed as Ewall loamy sand (soil mapunit 36) from the Lincoln County, Washington, Soil Survey, and was correctly correlated to a *Sandy 9-15 inch precipitation* Ecological Site Description (R008XY501WA). Ewall soils are very deep, excessively drained soils formed in Missoula Flood outwash deposits or dune sand on terraces.

Very little evidence of erosion by water or wind was present, and the amount of plant litter and bare ground was within the range expected for the site. Bare ground was noted predominantly in the areas between shrub canopies. The presence and distribution of biological soil crusts was also within the range expected for the site. Livestock trails in the area did not display any downcutting from water erosion, and adjacent plants did not display any coppice dunes from wind erosion off these trails (Figure 12).

Present vegetation of the site was Basin big sagebrush (*Artemisia tridentata* Nutt. ssp. *tridentata*) and green rabbitbrush (*Chrysothamnus viscidiflorus*). The understory consisted of needle-and-thread grass (*Stipa comata*), bluebunch wheatgrass (*Pseudoroegneria spicata*), with non-native Japanese brome (*Bromus japonicus*) and cheatgrass (*Bromus tectorum*) widely distributed throughout the site. The vigor and reproductive capability of the perennial plants in the area did not appear to have been affected.

Evidence of recent livestock grazing was present, but impacts to soil, hydrologic, and biotic resources were minimal.

Assessment Results: Using the preponderance of evidence approach, the team noted a ***none to slight*** departure from the Soil/Site Stability attribute, a ***none to slight*** departure from the Hydrologic Function attribute, and a ***moderate*** departure from the Biotic Integrity attribute, mainly due to the presence of invasive plant species on the site, and a moderate decline in functional groups expected for the sight.

Management recommendations: Current livestock management appears to be compatible with the Indicators of Rangeland Health, but care should be taken to monitor trends within the functional groups of the same, as well as the spatial distribution of invasive plants in the area. However, please see concerns regarding perennial grasses in the "Management recommendations" section for the Rosenberg Allotment.

Green Allotment – Site 2, East of the Riparian Assessment

The site for the rangeland assessment was located on a fan terrace north and east from the riparian site. This was at a slightly higher elevation from the previous site, and was on a slightly steeper slope (Figures 1 and 13). Information from this

site can be observed in Appendix 3 – Rangeland Health Evaluation Summary Worksheets.

The soil at the site was confirmed as Ewall loamy sand (soil mapunit 36) from the Lincoln County, Washington, Soil Survey, and was correctly correlated to a *Sandy 9-15 inch precipitation* Ecological Site Description (R008XY501WA). Ewall soils are very deep, excessively drained soils formed in Missoula Flood outwash deposits or dune sand on terraces.

Very little evidence of erosion by water or wind was present, and the amount of plant litter and bare ground was within the range expected for the site. Bare ground was noted predominantly in the areas between shrub canopies. The presence and distribution of biological soil crusts was also within the range expected for the site.

Present vegetation of the site was Basin big sagebrush (*Artemisia tridentata* Nutt. ssp. *tridentata*) and green rabbitbrush (*Chrysothamnus viscidiflorus*). The understory consisted of needle-and-thread grass (*Stipa comata*), bluebunch wheatgrass (*Pseudoroegneria spicata*), with non-native Japanese brome (*Bromus japonicus*) and cheatgrass (*Bromus tectorum*) widely distributed throughout the site. There was also evidence of a past fire in the area, but the team could not determine the period of occurrence.

Assessment Results: Using the preponderance of evidence approach, the team noted a ***none to slight*** departure from the Soil/Site Stability attribute, a ***none to slight*** departure from the Hydrologic Function attribute, and a ***slight to moderate*** departure from the Biotic Integrity attribute, mainly due to the presence of invasive plant species on the site, and a decline in functional groups expected for the sight.

Management recommendations: Current livestock management appears to be compatible with the Indicators of Rangeland Health. However, please see concerns regarding perennial grasses in the "Management recommendations" section for the Rosenberg Allotment**.**

3. Eckman Allotment

The site for the rangeland assessment was located on an alluvial fan just south and west from the riparian site evaluated (Figures 6 and 14). Information from

this site can be observed in Appendix 3 – Rangeland Health Evaluation Summary Worksheets.

The soil at the site was confirmed as Peone silt loam (soil mapunit 172) from the Stevens County, Washington, Soil Survey, and was correctly correlated to an *Alkali Bottom 15 inch plus* precipitation zone Ecological Site Description (R009XY401WA). Peone soils are very deep, poorly drained soils formed in alluvium derived mainly from volcanic ash mixed with loess. Peone soils are identified as a hydric soil, and have a seasonal high water table at a depth of 12 inches in the spring. Note: Although we did not perform a formal wetland delineation study at this site, our observations regarding soil, hydrology, and vegetation characteristics indicated that it is likely a wetland.

There was evidence of water erosion throughout the site, with water flow patterns greater than expected. Slightly uphill from the site, a large gully system was forming, and bank sloughing was evident within the gully, as well as on the lakeshore, possibly due to fluctuation of reservoir levels or wave action. The soil surface resistance to erosion was greater than expected, and a compaction layer was clearly evident at a depth of 2 inches. Soil disturbances were evident on the site, but appeared to be occurring from both livestock and recreational activities. The amount of plant litter and bare ground was slightly less than the range expected for the site. The presence and distribution of biological soil crusts was also slightly less than the range expected for the site.

Present vegetation of the site included scattered sedges (*Carex retrorsa*), dock (*Rumex sp.*), yarrow (*Achillea millefolium*), with some introduced species such as western wheatgrass (*Pascopyrum smithii*), redtop (*Panicum rigidulum*), and reed canary grass (*Phalaris arundinacea*). Non native plants such as Canada thistle (*Cirsium arvense*) and diffuse knapweed were also present on the disturbed sites. The plant community composition and distribution had an extreme departure from what would be expected for this site, and the functional and structural groups present at the site had a moderate departure from what would be expected.

Assessment Results: Using the preponderance of evidence approach, the group noted a ***moderate*** departure from the Soil/Site Stability attribute, a ***moderate*** departure from the Hydrologic Function attribute, and ***moderate*** departure from the Biotic Integrity attribute. These results are mainly due to the amount of disturbance at the site (from both livestock and recreational use), as well as the presence of invasive and non-native plant species on the site.

Under current management, the lack of appropriate vegetation cover and community structure, along with the impacts to the soils and overall site stability do not allow this system to provide the normal functions of a healthy rangeland site. However, the group feels it is important to note that this protocol performed is not intended to be used as a "stand alone tool" to determine the final "health" or functional status of the three attributes of rangeland health.

Management recommendations: We recommend excluding cattle and visitor use from both the adjacent area of proposed stream channel restoration and this area of evaluation for an extended period of time. Active management of weeds may be necessary as they are well established. In addition, the establishment of monitoring plots will aid in determining if and when the site is stable enough to withstand pressure from visitors and/or livestock.

A cautionary note: Livestock management in this allotment, particularly this site, has been a dominant source of perturbation. The evidence suggests that livestock have used this area intensively for loafing, water, and intensive feeding. Reintroducing the stock to this site without management adjustments for timing, number, and distribution of livestock will likely result in continued degradation.

4. Henslee Allotment

We did not conduct an upland assessment for the improved pastures north of our wetland assessment area (Figure 9) because the upland assessment tool is designed for lands with native vegetation under predominantly natural processes. The group did discuss the general character of the improved pastures and the following observations were shared and recommendations identified:

1. The improved pastures are dominated by diffuse knapweed. The knapweed could be dominating the site for a variety of reasons. However, the "kind" of livestock using the forage may keep this pasture from recovery. Specifically, these pastures are grazed by llama and horses which will not typically eat knapweed and, therefore, are likely to enhance knapweed presence. Although herbicides are useful, it may be worth considering changing the herbivore. It is becoming increasingly common that cattle will graze on knapweed as part of their diet. Similarly, sheep are also known to eat knapweed.

2. Woody vegetation along the shoreline is slow to develop. This may be due to the presence of the llamas, which are known for selecting both woody and herbaceous foods as part of their diet. We recommend restricting llama herbivory in those areas where woody vegetation is desirable.

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Condition and the Supporting Science for Lotic Areas. TR 1737-15. BLM National Applied Resource Sciences Center. Denver, CO. 126 pp.

Figures

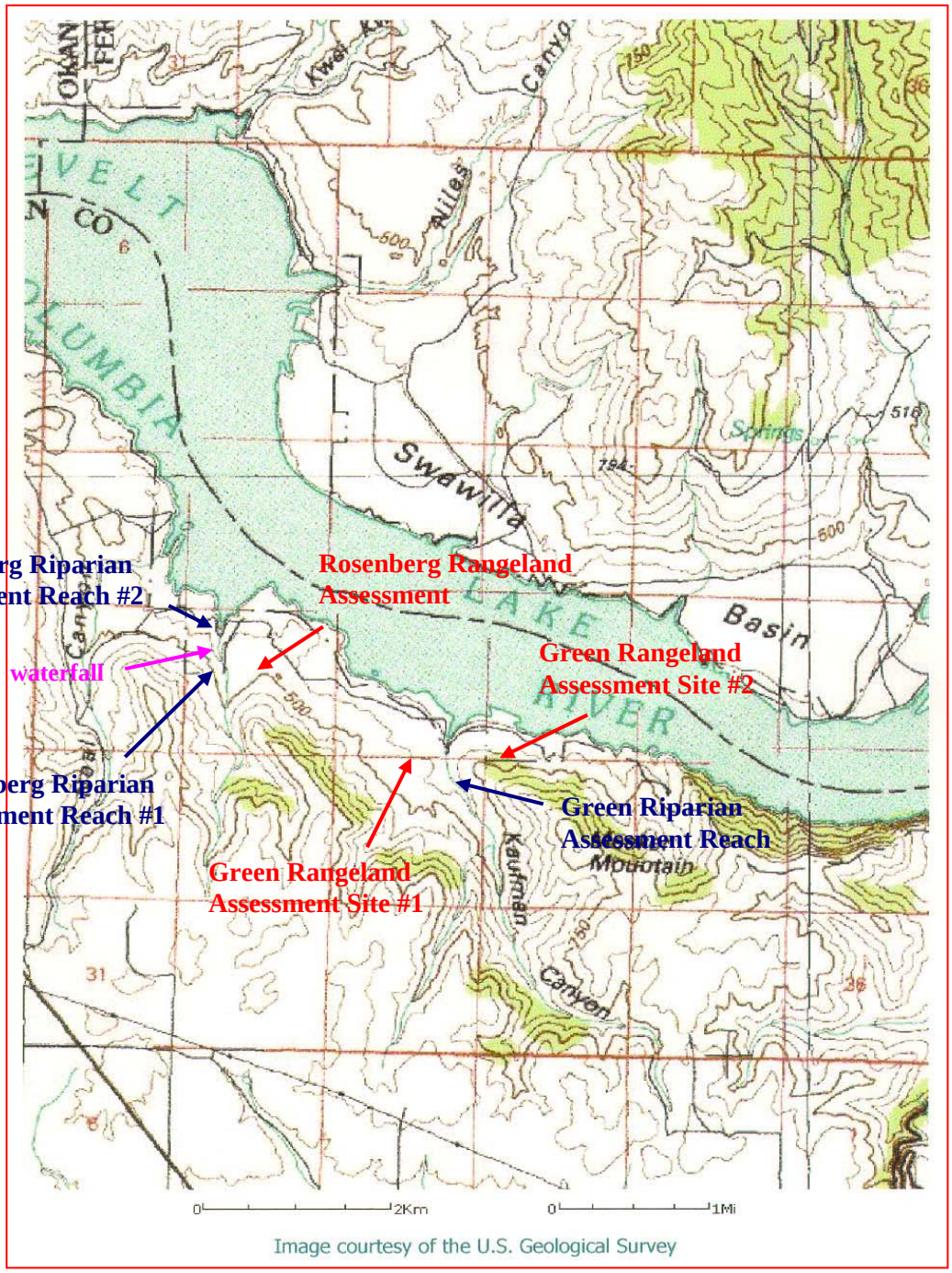

Figure 1. Locations of riparian and rangeland assessments within the Rosenberg and Green grazing allotments.

Figure 2. Rosenberg Reach #2 stream channel

Figure 3. Rosenberg Reach #2 - sediment inputs from trail

Figure 4. Green Riparian Assessment Reach (Kaufman Canyon)

Figure 5. Herbaceous community in Green Riparian Assessment Reach

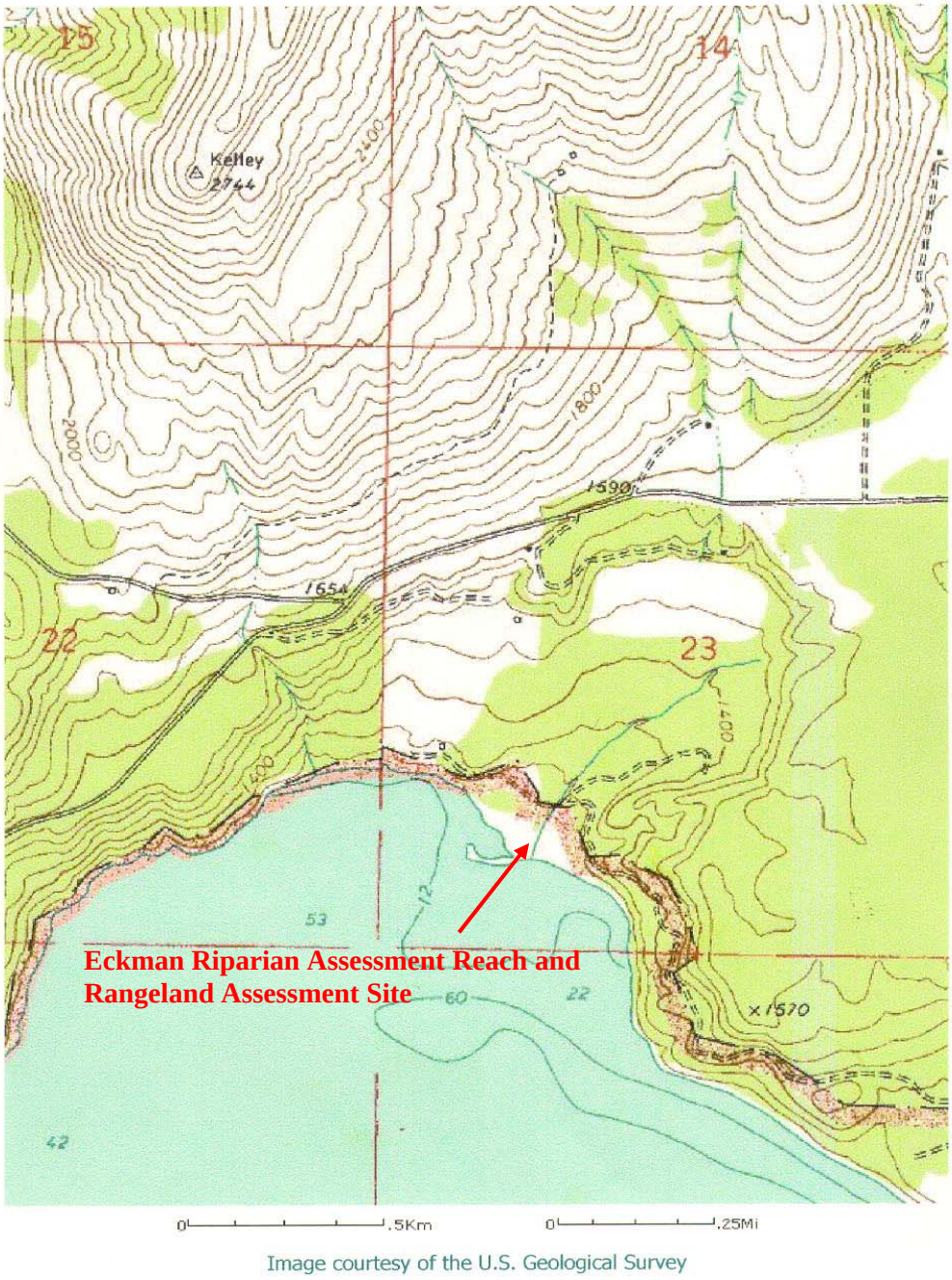

Figure 6. Locations of riparian and rangeland assessments within the Eckman grazing allotment.

Figure 7a. Incised channel on Eckman allotment (looking upstream)

Figure 7b. Incised channel on Eckman allotment (looking downstream)

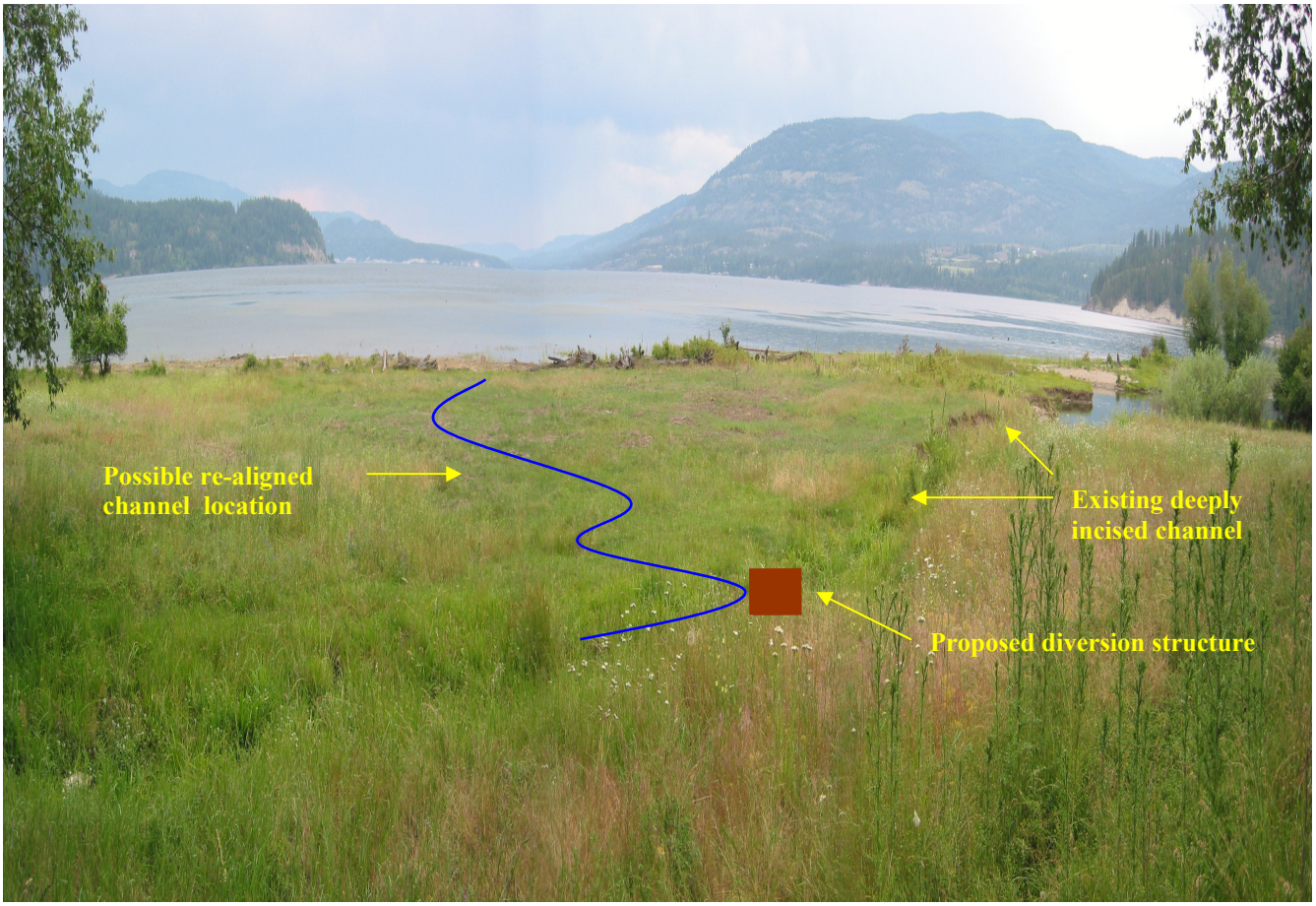

Figure 8. Location of proposed structure to arrest headcut and create new channel on Eckman allotment (exact channel location and dimensions to be determined).

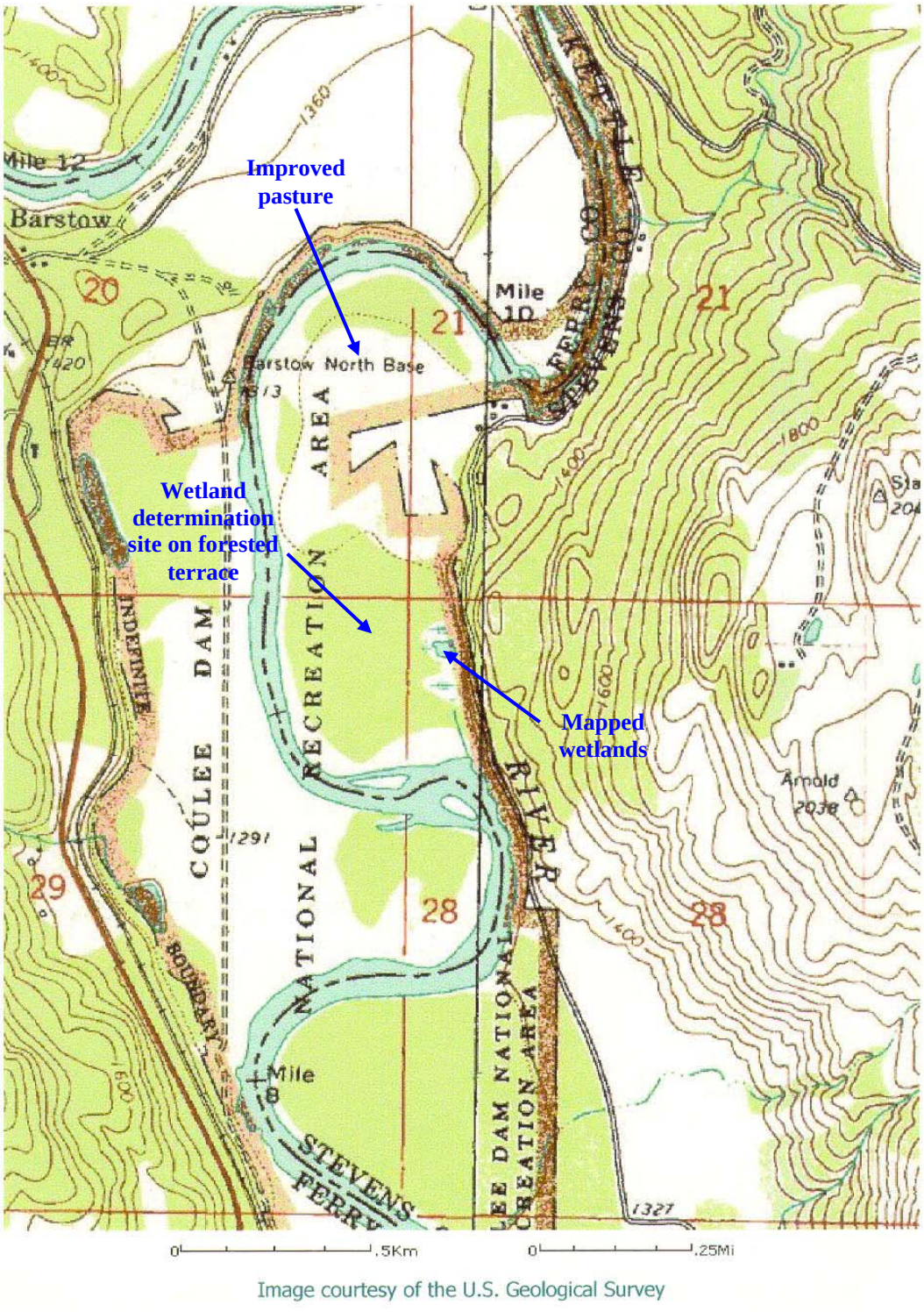

Figure 9. Location of wetland determination study on Henslee allotment

Figure 10. Rosenberg allotment rangeland assessment site

Figure 11. Green allotment rangeland assessment, site 1

Figure 12. Livestock trail with minimal signs of accelerated water or wind erosion on Green allotment, site 1

Figure 13. Green allotment rangeland assessment site 2

Figure 14. Eckman allotment rangeland assessment site

Appendix 1 – Proper Functioning Condition Worksheets

Rosenberg Allotment – Reach #1

Lotic Standard Checklist

Name of Riparian-Wetland Area: LARO – Unnamed stream, Rosenberg/Neal Road Allotment
Date: 6-22-2004 Segment/Reach ID: Reach #1 (above waterfall)
Miles: _____ Acres: _____
ID Team Observers: Wagner, Martin, Biggam, Fleenor, Bobowski, Pearson, Weaver

Yes	No	N/A	HYDROLOGY
		X	1) Floodplain above bankfull is inundated in "relatively frequent" events
		X	2) Where beaver dams are present they are active and stable
X			3) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
X			4) Riparian-wetland area is widening or has achieved potential extent
X			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
		X	6) There is diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
X			7) There is diverse composition of riparian-wetland vegetation for maintenance/recovery)
X			8) Species present indicate maintenance of riparian-wetland soil moisture characteristics
X			9) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high-streamflow events
X			10) Riparian-wetland plants exhibit high vigor
X			11) Adequate riparian-wetland vegetative cover is present to protect banks and dissipate energy during high flows
		X	12) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION/DEPOSITION
X			13) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) are adequate to dissipate energy
		X	14) Point bars are revegetating with riparian-wetland vegetation
X			15) Lateral stream movement is associated with natural sinuosity
X			16) System is vertically stable
X			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

(Revised 1999)

Remarks (numbers correspond to checklist items)

1. Narrow, relatively straight, moderately steep-gradient, V-shaped, bedrock controlled channel that does not rely on a floodplain to dissipate energy for higher frequency flood events. Channel doesn't appear to be subjected to high flows very often (no evidence of flood flows such as debris or scour), which may be related to very high infiltration rates in the watershed (little evidence of surface flow in uplands) and small watershed area.
3. Stream gradient is in balance with the landscape via step-pool morphology, which is appropriate to the relatively steep valley gradient (approx. 4%). Very low sinuosity expected here. Width/depth ratio appropriate to channel type.
6. Cottonwoods appear to be "replacement age," but no recent recruitment evident. Such recruitment is expected to be a very rare event in this V-shaped channel that apparently floods only infrequently. No willow present. Alder has diverse age classes.
7. Tree/shrub dominants = *Populus trichocarpa* (black cottonwood), *Alnus incana* (mountain alder), *Amelanchier alnifolia* (serviceberry), *Rosa woodsii* (wood rose), *Philadelphus lewisii* (mock orange), *Rubus parviflora* (thimbleberry). Herbaceous dominants = *Urtica dioica* (stinging nettle), *Clematis* sp., *Gallium* sp. (bedstraw). Herbaceous vegetation very limited due to dense canopy.
9. Extensive cover of cottonwood, alder, and other species expected to withstand high flow events.
14. Point bars are not found in this channel type.

Summary Determination

Functional Rating:		Trend for Functional – At Risk:	
Proper Functioning Condition	X	Upward	_____
Functional – At Risk	_____	Downward	_____
Nonfunctional	_____	Not Apparent	_____
Unknown	_____		

Additional notes: Bedrock control is a major factor in vertical stability. Lack of willows is notable from a habitat perspective, but is not a significant issue with respect to channel stability due to bedrock control and an abundance of other bank-stabilizing species such as alder, wood rose, and serviceberry.

Cattle trailing near the banks and at occasional stream access points have led to localized bank instability and increased sediment, but this is not seen as a significant overall destabilizing factor (i.e., site is not "at-risk").

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes _____
No __X__

If yes, what are those factors?

___ Flow regulations ___ Mining activities ___ Upstream channel conditions
___ Channelization ___ Road encroachment ___ Oil field water discharge
___ Augmented flows ___ Other (specify)_____

Rosenberg Allotment – Reach #2

Lotic Standard Checklist

Name of Riparian-Wetland Area: LARO – Unnamed stream, Rosenberg/Neal Road Allotment
Date: 6-22-2004 Segment/Reach ID: Reach #2 (below waterfall to road crossing)
Miles: _____ Acres: _____
ID Team Observers: Wagner, Martin, Biggam, Fleenor, Bobowski, Pearson, Weaver

Yes	No	N/A	HYDROLOGY
		X	1) Floodplain above bankfull is inundated in "relatively frequent" events
		X	2) Where beaver dams are present they are active and stable
X			4) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
X			4) Riparian-wetland area is widening or has achieved potential extent
X			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
X			10) There is diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
X			11) There is diverse composition of riparian-wetland vegetation for maintenance/recovery)
X			12) Species present indicate maintenance of riparian-wetland soil moisture characteristics
X			13) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high-streamflow events
X			10) Riparian-wetland plants exhibit high vigor
	X		14) Adequate riparian-wetland vegetative cover is present to protect banks and dissipate energy during high flows
		X	15) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION/DEPOSITION
X			16) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) are adequate to dissipate energy
		X	14) Point bars are revegetating with riparian-wetland vegetation
X			15) Lateral stream movement is associated with natural sinuosity
	X		16) System is vertically stable
X			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

(Revised 1999)

Remarks (numbers correspond to checklist items)

2. Narrow, relatively straight, moderately steep-gradient, V-shaped channel that does not rely on a floodplain to dissipate energy for higher frequency flood events. Channel doesn't appear to be subjected to high flows very often (no evidence of flood flows such as debris or scour), which may be related to very high infiltration rates in the watershed (little evidence of surface flow in uplands) and small watershed area.
3. Stream gradient is in balance with the landscape via step-pool morphology, which is appropriate to the relatively steep valley gradient (approx. 4%). Very low sinuosity expected here. Width/depth ratio appropriate to channel type.
4. Has achieved potential extent.
6. Red-osier dogwood, wood rose, and mock orange spreading extensively (likely vegetatively). No willows and few cottonwoods present. Recruitment of willow or cottonwood is expected to be very rare in this V-shaped channel where larger floods are apparently rare.
7. Tree/shrub dominants = *Cornus stolonifera* (red-osier dogwood), *Philadelphus lewisii* (mock orange), *Rosa woodsii* (wood rose). Very little herbaceous cover due to dense overstory – herbaceous component not playing a discernible role in bank or channel stability.
9. Extensive cover and root systems of red-osier dogwood and wood rose expected to withstand high flow events.
11. Lack of herbaceous vegetation component (shade due to dense overstory) leaves bottom of channel susceptible to erosion.
14. Point bars are not found in this channel type.
16. There is an inherent risk of incision during large floods in this channel type since there is no bedrock control and almost no herbaceous vegetation component.

Summary Determination

Functional Rating:		Trend for Functional – At Risk:	
Proper Functioning Condition	_____	Upward	_____
Functional – At Risk	__X__	Downward	_____
Nonfunctional	_____	Not Apparent	__X__
Unknown	_____		

Additional notes: The "Functional –At Risk" rating is due to the occurrence of a steep alluvial channel that dissipates energy via bed-step form without bedrock control, large boulders, etc. We cannot quantify the level of risk for channel incision during a large flood without extensive hydrologic analysis. This risk is inherent in this channel type, and no management actions are necessary. Lack of willows is notable from a wildlife habitat perspective, but is not a significant issue with respect to lateral channel stability due to an abundance of other bank-stabilizing woody species such as red-osier dogwood and wood rose. Cattle trailing near the banks and at occasional stream access points have led to localized bank instability and increased sediment, but this is not seen as a significant overall destabilizing factor.

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes _____
No __X___

If yes, what are those factors?

___ Flow regulations ___ Mining activities ___ Upstream channel conditions
___ Channelization ___ Road encroachment ___ Oil field water discharge
___ Augmented flows ___ Other (specify)_____

Green Allotment

Lotic Standard Checklist

Name of Riparian-Wetland Area: LARO – Green Allotment (Kaufman Canyon)
Date: 6-23-2004 Segment/Reach ID: 200' S. of Green property line to lake
Miles: _____ Acres: _____
ID Team Observers: Wagner, Martin, Pearson

Yes	No	N/A	HYDROLOGY
X			1) Floodplain above bankfull is inundated in "relatively frequent" events
		X	2) Where beaver dams are present they are active and stable
X			5) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
X			4) Riparian-wetland area is widening or has achieved potential extent
X			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
X			14) There is diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
X			15) There is diverse composition of riparian-wetland vegetation for maintenance/recovery)
X			16) Species present indicate maintenance of riparian-wetland soil moisture characteristics
X			17) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high-streamflow events
X			10) Riparian-wetland plants exhibit high vigor
X			17) Adequate riparian-wetland vegetative cover is present to protect banks and dissipate energy during high flows
		X	18) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION/DEPOSITION
X			19) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) are adequate to dissipate energy
X			14) Point bars are revegetating with riparian-wetland vegetation
X			15) Lateral stream movement is associated with natural sinuosity
X			16) System is vertically stable
X			17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

(Revised 1999)

Remarks (numbers correspond to checklist items)

1. Channel is not as entrenched as at the Rosenberg sites and does have an associated floodplain. But floodplain is not accessed very frequently due to natural watershed characteristics (small watershed, high infiltration rates in upland soils). Lack of flood debris on floodplain suggests that overbank flood flows may be infrequent.
3. Channel sinuosity and bed steps and healthy riparian vegetation development combine to disperse stream energy. Therefore, no significant channel incision or lateral migration. Width/depth ratio, sinuosity, and channel/floodplain form appropriate to approx. 2% valley grade.
6. Reproduction and replacement ages present for at least two willow species (*Salix exigua* and *Salix lasiandra*), and possibly a third (*Salix lutea*?). Black cottonwood (*Populus trichocarpa*) also showing substantial reproduction and replacement age classes in most areas.
7. Tree dominant = *Populus trichocarpa* (black cottonwood). Shrub dominants = *S. exigua* (sandbar willow), *S. lasiandra* (whiplash willow), *Rosa woodsii* (wood rose), and *Amelanchier alnifolia* (serviceberry). Herbaceous dominants = *Mimulus* sp. (monkey flower), *Veronica* sp., *Poa* sp., *Polygonum* sp., *Carex* spp. (2 sedge species, not in flower) and *Juncus* sp. *Juncus ensifolius* also observed. Extensive cover of cottonwood, willow, and other bank and channel stabilizing species expected to withstand high flow events. Note: Sage and bluegrass present on channel edges at slightly incised locations.
8. Yes, except in small areas where channel is slightly incised and sage and bluegrass are encroaching.
13. Adequate to dissipate energy for moderate flows, but there is some risk of incision during high flows in a moderate-grade alluvial channel like this. Continued maintenance of currently healthy riparian-wetland vegetation is a very important factor in stability in this channel type.
16. Again, protection from such incision is highly dependent on maintenance of healthy riparian-wetland vegetation.

Summary Determination

Functional Rating:		Trend for Functional – At Risk:	
Proper Functioning Condition	X	Upward	_____
Functional – At Risk	_____	Downward	_____
Nonfunctional	_____	Not Apparent	_____
Unknown	_____		

Additional notes:

1. This watershed has the same upland soil group as the Rosenberg/Neal Rd. site (high infiltration and limited runoff).
2. This site is in PFC, but could become "At-Risk" if additional grazing pressure began to degrade vegetation characteristics. Park is advised to maintain vegetation community health by not extending grazing any further into the growing season than current management allows.

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes _____
No __X___

If yes, what are those factors?

___ Flow regulations ___ Mining activities ___ Upstream channel conditions
___ Channelization ___ Road encroachment ___ Oil field water discharge
___ Augmented flows ___ Other (specify)_____

Eckman Allotment

Lotic Standard Checklist

Name of Riparian-Wetland Area: LARO – Eckman Allotment – unnamed stream flowing from impounded wetland area and terminating at lakeshore sand spit
Date: 6-24-2004 Segment/Reach ID: From lakeshore outfall upstream approx. 250'
Miles: _____ Acres: _____
ID Team Observers: Wagner, Martin

Yes	No	N/A	HYDROLOGY
	X		1) Floodplain above bankfull is inundated in "relatively frequent" events
		X	2) Where beaver dams are present they are active and stable
	X		6) Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
	X		4) Riparian-wetland area is widening or has achieved potential extent
X			5) Upland watershed is not contributing to riparian-wetland degradation

Yes	No	N/A	VEGETATION
	X		18) There is diverse age-class distribution of riparian-wetland vegetation (recruitment for maintenance/recovery)
	X		19) There is diverse composition of riparian-wetland vegetation for maintenance/recovery)
	X		20) Species present indicate maintenance of riparian-wetland soil moisture characteristics
	X		21) Streambank vegetation is comprised of those plants or plant communities that have root masses capable of withstanding high-streamflow events
	X		10) Riparian-wetland plants exhibit high vigor
	X		20) Adequate riparian-wetland vegetative cover is present to protect banks and dissipate energy during high flows
		X	21) Plant communities are an adequate source of coarse and/or large woody material (for maintenance/recovery)

Yes	No	N/A	EROSION/DEPOSITION
	X		22) Floodplain and channel characteristics (i.e., rocks, overflow channels, coarse and/or large woody material) are adequate to dissipate energy
	X		14) Point bars are revegetating with riparian-wetland vegetation
	X		15) Lateral stream movement is associated with natural sinuosity
	X		16) System is vertically stable
	X		17) Stream is in balance with the water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

(Revised 1999)

Remarks (numbers correspond to checklist items)

1. Channel has incised 8-10 feet near the lake edge; headcut extends approx. 200' upstream from high pool level.
3. Deep channel incision; headcut continuing to migrate upstream.
4. No, riparian-wetland area narrowing due to incision.
5. But substantial degradation due to incision is exacerbated by local cattle hoof action.
6. Willows expected but absent in almost all locations (*S. exigua* found nearby on lakeshore and a few small, isolated plants along stream). Herbaceous riparian-wetland vegetation also very poorly developed – a few very scattered *Carex retrorsa*, *Rumex sp.* (dock), and watercress, but most herbaceous vegetation within incised channel is upland weeds such as smooth brome, Japanese brome, and diffuse knapweed.
7. Almost no woody riparian vegetation exists except for a few small, isolated *S. exigua* (95% of stream reach has no woody riparian vegetation). Wetland-riparian herbaceous vegetation is sparse except for watercress in flowing water (mostly upland weeds).
8. Wetland-riparian vegetation restricted to narrow (1-2 feet), incised channel bottom (in flowing water) and perhaps 6-12 inches on either side before steep walls of incised banks create dry habitat for upland weeds.
9. No mature woody riparian vegetation. Native herbaceous wetland species found only within narrow channel bottom and not at all on adjacent banks, which are either bare or have upland species (banks are generally failing and adding excess sediment to stream and lake).
10. Almost no woody riparian vegetation; sedges very sparse and not spreading noticeably.
11. No – same reasons as above.

13-17. Active headcutting; energy dissipated through headcutting and bank erosion.

Summary Determination

Functional Rating:		Trend for Functional – At Risk:	
Proper Functioning Condition	_____	Upward	_____
Functional – At Risk	_____	Downward	_____
Nonfunctional	_ X__	Not Apparent	_____
Unknown	_____		

Additional notes: It is possible that combined effects of cattle impacts and large lake level fluctuations caused the problems here, though this is difficult to verify. When lake stage drops significantly due to dam operations, the hydraulic gradient at the stream inflow point may increase dramatically. If cattle caused the loss of channel-stabilizing vegetation (eating/trampling), this may have facilitated headcut formation, with subsequent migration upstream. Such incision can cause willows and herbaceous wetland vegetation to die off due to a lowered water table, and they may not be replaced due to lack of suitable reestablishment areas (incised channel with steep banks) and/or additional grazing and trampling effects. While it is not possible to recreate the exact cause and effect process, it seems clear that keeping cattle out of riparian areas would be beneficial, and may even prevent such incisions in some areas.

Are factors contributing to unacceptable conditions outside the control of the manager?

Yes __X__
No _____

If yes, what are those factors?

___ Flow regulations ___ Mining activities ___ Upstream channel conditions
___ Channelization ___ Road encroachment ___ Oil field water discharge
___ Augmented flows _X__ Other (specify): Lake level regulation

Appendix 2: Wetland Determination Worksheet -- Henslee Allotment

DATA FORM-- ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Henslee Grazing Allotment Applicant/Owner: Lake Roosevelt National Recreation Area Investigators: Wagner, Biggam, Martin, Fleenor, Bobowski, Pearson	Date: 06-24-04 County: Stevens State: Washington
Do Normal Circumstances exist on the site? X Yes __ No Is the site significantly disturbed (Atypical Situation) ___Yes X No Is the area a potential Problem Area? ___Yes X No (if needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: _____

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Betula occidentalis (spring birch)	Tree	FACW	9.		
2. Populus tremuloides (quaking aspen)	Tree	FAC+	10.		
3. Alnus crispa (green alder)	Shrub	FACW	11.		
4. Symphoricarpos albus (snowberry)	Shrub	FACU	12.		
5. Berberis repens (Barberry)	Shrub	UPL	13.		
6. Rhus radicans (poison ivy)	Herb	FACU	14.		
7.Galium aparine (bedstraw)	Herb	FACU	15.		
8. Carex sp. (unidentified sedge)	Herb	FAC(?)	16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-): 4/8 = 50%

Remarks:
- Used "3/5 rule" to determine dominants (top 3 dominants in descending order of cover for each stratum if > 2 strata). Only two tree species listed since there was not a third rooted in the channel.
- Carex sp. could not be identified at this time. Assumed that the indicator status was FAC or wetter for this analysis (conservative approach).
- Percent OBL, FACW, or FAC must exceed 50% to meet hydrophytic vegetation criterion. Therefore, site doesn't have hydrophytic vegetation (hydrology and soil should be looked at closely in this case to see if more rigorous investigation needed).

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other

___ No Recorded Data Available

Field Observations:

Depth of Surface Water: _____(in.)

Depth to Free Water in Pit: > 40" (in.)

Depth to Saturated Soil: 40" (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks: Site appears to be an abandoned stream channel, but no indication of "drainage patterns in wetlands" or other indicators.

SOILS

Map Unit Name
(Series and Phase): 246 – Wethey loamy sand (Stevens Co., WA Soil Survey Area)
Drainage Class: somewhat poorly drained
Taxonomy (Subgroup): sandy, mixed mesic Aquic Xerofluvent
Field Observations Confirm Mapped Type? Yes X No ___

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Color (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-7	A	10 YR 3/3	N/A	none	loamy fine sand
7-41	C1	10 YR 4/3	N/A	none	loamy sand
41+	Cg	10 YR 5/2	7.5 YR 4/4	common/fine to medium	sand

Hydric Soil Indicators: None – does not meet indicators for sandy soil

_____ Histosol
_____ Histic Epipedon
_____ Sulfidic Odor
_____ Aquic Moisture Regime
_____ Reducing Conditions
_____ Gleyed or Low-Chroma Colors
_____ Concretions
_____ High Organic Content in Surface Layer in Sandy Soils
_____ Organic Streaking in Sandy Soils
_____ Listed on Local Hydric Soils List
_____ Listed on National Hydric Soils List
_____ Other (Explain in Remarks)

Remarks: Used USDA-NRCS Field Indicators of Hydric Soils. Classified as a sandy soil; did not meet any of the S1 – S10 indicators.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes ___ No X
Wetland Hydrology Present? Yes ___ No X
Hydric Soils Present? Yes ___ No X

Is this Sampling Point Within a Wetland? ___ Yes X No

Remarks: Sampling location is part of a narrow abandoned stream channel (6-8 ft wide) that meanders across the site. The bottom of the channel represents the lowest point in the landscape other than the river, and the only potential wetland habitat that we observed. This site failed to meet any of the three wetland criteria.

Appendix 3 : Rangeland Health Evaluation Summary Worksheets

Rosenberg Allotment – Sheet 1 of 2

ROSENBERG
SITE #1

Rangeland Health Evaluation Summary Worksheet

Part 1. Area of Interest Documentation (**Bold** items require completion, other information is optional)

State WASHINGTON **Office** LARO **Management Unit** SPRING CANYON - Rosenberg

Pasture/Watershed Rosenberg ID# _____ Major Land Resource Area MLRA-8

Location (description) Rosenberg Allotment - East of Neal Canyon

Legal T ___ ,R ___ ,Sec ___ , ___ 1/4, ___ 1/4 or Lat 47, 54.43.8 | 118 49 15.3 ,Long ___ or UTM Coord _____

Size of Evaluation Area _____ **Photo(s) Taken** Yes X No ___

Observer(s) P.B. G.P. B.B. R.F. **Date** 6/22/04

Ecological Site SANDY 9-15" P.Z. Soil Map Unit Name MU-36 - Lincoln Co. WA Ewall Loamy SAND

Soil/Site Verification

Rangeland Ecological Site Description and/or Soil Survey	Area of Interest Determination
Surface Texture LOAMY SAND	Surface Texture LOAMY SAND
Depth: Very Shallow ☐ Shallow ☐ Moderate ☐ Deep ☒ (<10") (10"-20") (20"-40") (>40")	Depth: Very Shallow ☐ Shallow ☐ Moderate ☐ Deep ☒ (<10") (10"-20") (20"-40") (>40")
List diagnostic horizons in profile and depth	List diagnostic horizons in profile and depth
1 OCHRIC 3 _____	1 OCHRIC 3 _____
2 CAMBIC 4 _____	2 CAMBIC 4 _____

Parent Material eolian alluvium **Slope** 6 % Elevation ___ ft Topographic Position convex bench **Aspect** NW

Avg Annual Precip 12 **Recent Weather (last 2 years)** Drought X Normal ___ Wet ___

Describe wildlife and livestock use and recent disturbances Heavy Use by Rosenberg Permittee IN EARLY SPRING (APRIL 1 - MAY 30) and late Fall/Winter

Describe offsite influences on area of interest PAST LIVESTOCK USE - Some Agriculture limited to Homesteads. Area influenced Strongly by Geomorphic processes from Lake Missoula Floods

Part 2. Indicator Rating

		Departure from Ecological Site Description/ Ecological Reference Area(s)				
Attribute	**Indicators**	**Extreme**	**Moderate to Extreme**	**Moderate**	**Slight to Moderate**	**None to Slight**
S,H	1. Rills					X
Comments:	none present due to soil texture / slope					
S,H	2. Water Flow Patterns					X
Comments:	none present					
S,H	3. Pedestals and/or Terracettes					X
Comments:	none present					
S,H	4. Bare Ground				X	
Comments:	- intercanopy areas					
S,H	5. Gullies					X
Comments:	none					
S	6. Wind-Scoured, Blowouts, and/or Deposition Areas					X
Comments:	none					

Rosenberg Allotment – Sheet 2 of 2

Part 2. Indicator Rating (continued)

Attribute	Indicators	Departure from Ecological Site Description/ Ecological Reference Area(s)				
		Extreme	Moderate to Extreme	Moderate	Slight to Moderate	None to Slight
H	7. Litter Movement				X	
Comments:	blowing off intercanopy areas					
S,H,B	8. Soil Surface Resistance to Erosion				X	
Comments:	intercanopy areas					
S,H,B	9. Soil Surface Loss or Degradation					X
Comments:						
H	10. Plant Community Composition and Distribution Relative to Infiltration and Runoff					X
Comments:						
S,H,B	11. Compaction Layer					X
Comments:						
B	12. Functional/Structural Groups			X		
Comments:						
B	13. Plant Mortality/Decadence				X	
Comments:						
H,B	14. Litter Amount			X		
Comments:						
B	15. Annual Production				X	
Comments:						
B	16. Invasive Plants		X			
Comments:						
B	17. Reproductive Capability of Perennial Plants				X	
Comments:						

18. Biological Crusts [X]

Part 3. Summary

A. Indicator Summary

	Rangeland Health Attributes	Departure from Ecological Site Description/ Ecological Reference Area(s)					
		Extreme	Moderate to Extreme	Moderate	Slight to Moderate	None to Slight	Σ
S	Soil/Site Stability (Indicators 1-6, 8, 9 &11) 18				III	7	~~8~~ 10
H	Hydrologic Function (Indicators 1-5, 7-11 & 14) 19			I	IIII	~~IIII~~ 11	~~11~~ 12
B	Biotic Integrity (Indicators 8-9 & 11-17) 18		I	II	~~IIII~~	II	~~9~~ 10

B. Attribute Summary - Check the category that best fits the "preponderance of evidence" for each of the three attributes relative to the distribution of indicator ratings in the preceding Indicator Summary table.

Attribute	Extreme	Moderate to Extreme	Moderate	Slight to Moderate	None to Slight
Soil/Site Stability Rationale:					X (7)
Hydrologic Function Rationale:					X (7)
Biotic Integrity Rationale:				X (5)	

Green Allotment – Site 1, Sheet 1

GREEN ALLOTMENT
SITE ① of ②

Rangeland Health Evaluation Summary Worksheet

Part 1. Area of Interest Documentation (**Bold** items require completion, other information is optional)

State WASHINGTON **Office** LARO **Management Unit** SPRING MTN. GREEN ALLOTMENT

Pasture/Watershed GREEN ID# _____ Major Land Resource Area 9

Location (description) 1ST SITE GREEN - 365494 8E | 5307526 N

Legal T ___ ,R ___ ,Sec ___ , ___ 1/4, ___ 1/4 or Lat ___ ,Long ___ or UTM Coord

Size of Evaluation Area 10 ACRES **Photo(s) Taken** Yes X No ___

Observer(s) P. B. B. B. R. F. **Date** 6/23/04

Ecological Site SANDY 9-15 P.2 R008XY501WA Soil Map Unit Name 36 - EWELL LOAMY SAND 0-15%.

Soil/Site Verification

Rangeland Ecological Site Description and/or Soil Survey	Area of Interest Determination
Surface Texture LOAMY SAND	Surface Texture _____
Depth: Very Shallow ☐ (<10") Shallow ☐ (10"-20") Moderate ☐ (20"-40") Deep ☐ (>40")	Depth: Very Shallow ☐ (<10") Shallow ☐ (10"-20") Moderate ☐ (20"-40") Deep ☐ (>40")
List diagnostic horizons in profile and depth	List diagnostic horizons in profile and depth
1 OCHRIC 3 _____	1 OCHRIC 3 _____
2 _____ 4 _____	2 _____ 4 _____

Parent Material OUTWASH/eolian **Slope** 6 % Elevation 1293 ft Topographic Position CONCAVE **Aspect** N

Avg Annual Precip 12 **Recent Weather (last 2 years)** Drought X Normal ___ Wet ___

Describe wildlife and livestock use and recent disturbances ACTIVE ALLOTMENT - EVIDENCE OF PAST FIRE, LIVESTOCK TRAILING TO WATER PRESENT

Describe offsite influences on area of interest ROAD ON DOWNSLOPE OF EVALUATION AREA - CATTLE TRAILS TO WATER

Part 2. Indicator Rating

		Departure from Ecological Site Description/ Ecological Reference Area(s)				
Attribute	**Indicators**	**Extreme**	**Moderate to Extreme**	**Moderate**	**Slight to Moderate**	**None to Slight**
S,H	1. Rills					X
Comments: None - influenced by soil texture and low slope						
S,H	2. Water Flow Patterns					X
Comments: None - (see above)						
S,H	3. Pedestals and/or Terracettes					X
Comments: None - (see above)						
S,H	4. Bare Ground				X	
Comments: - increases in inter-canopy areas - some disturbance present						
S,H	5. Gullies					X
Comments: None						
S	6. Wind-Scoured, Blowouts, and/or Deposition Areas					X
Comments: None						

Green Allotment – Site 1, Sheet 2

Part 2. Indicator Rating (continued)

		Departure from Ecological Site Description/ Ecological Reference Area(s)				
Attribute	**Indicators**	**Extreme**	**Moderate to Extreme**	**Moderate**	**Slight to Moderate**	**None to Slight**
H	7. Litter Movement					X
Comments:						
S,H,B	8. Soil Surface Resistance to Erosion					X
Comments:						
S,H,B	9. Soil Surface Loss or Degradation					X
Comments:						
H	10. Plant Community Composition and Distribution Relative to Infiltration and Runoff				X	
Comments:						
S,H,B	11. Compaction Layer					X
Comments:						
B	12. Functional/Structural Groups		X			
Comments:						
B	13. Plant Mortality/Decadence				X	
Comments:						
H,B	14. Litter Amount				X	
Comments:						
B	15. Annual Production				X	
Comments:						
B	16. Invasive Plants	X				
Comments:						
B	17. Reproductive Capability of Perennial Plants				X	
Comments:						

SHS 11B. Biological Soil Crust Integrity X

Part 3. Summary

A. Indicator Summary

		Departure from Ecological Site Description/ Ecological Reference Area(s)					
	Rangeland Health Attributes	**Extreme**	**Moderate to Extreme**	**Moderate**	**Slight to Moderate**	**None to Slight**	Σ
S	Soil/Site Stability (Indicators 1-6, 8, 9 &11)				I	~~IIII~~ IIII	~~9~~ 10
H	Hydrologic Function (Indicators 1-5, 7-11 & 14)				IIII	~~IIII~~ III	~~11~~ 12
B	Biotic Integrity (Indicators 8-9 & 11-17)	I	I		IIII	III	~~9~~ 10

B. Attribute Summary - Check the category that best fits the "preponderance of evidence" for each of the three attributes relative to the distribution of indicator ratings in the preceding Indicator Summary table.

Attribute	**Extreme**	**Moderate to Extreme**	**Moderate**	**Slight to Moderate**	**None to Slight**
Soil/Site Stability Rationale:					X
Hydrologic Function Rationale:					X
Biotic Integrity Rationale:		?	X		

¥ - INVASIVE PLANTS, FUNCTIONAL GROUPS

Green Allotment – Site 2, Sheet 1

GREEN ALLOTMENT
SITE (2) of (2)

Rangeland Health Evaluation Summary Worksheet

Part 1. Area of Interest Documentation (**Bold** items require completion, other information is optional)

State WASHINGTON **Office** LARO **Management Unit** GREEN ALLOTMENT

Pasture/Watershed GREEN ID# _____ Major Land Resource Area 8

Location (description) EAST OF 1ST SITE ACROSS INLET 366235 E | 5307376 N

Legal T ___ ,R ___ ,Sec ___ , ___ 1/4, ___ 1/4 or Lat ___ ,Long ___ of (UTM Coord) _____

Size of Evaluation Area 5 acres (approx) **Photo(s) Taken** Yes X No ___

Observer(s) PB, BB, RF **Date** 6/23/04

Ecological Site SANDY 9-15" P.Z. Soil Map Unit Name 36 - Ewell loamy sand
R008XY501WA

Soil/Site Verification

Rangeland Ecological Site Description and/or (Soil Survey)	Area of Interest Determination
Surface Texture loamy sand	Surface Texture loamy sand
Depth: Very Shallow ☐ (<10") Shallow ☐ (10"-20") Moderate ☐ (20"-40") Deep ☒ (>40")	Depth: Very Shallow ☐ (<10") Shallow ☐ Moderate ☐ Deep ☒ (>40")
List diagnostic horizons in profile and depth	List diagnostic horizons in profile and depth
1 OCHRIC 4" 3 _____	1 OCHRIC 3 _____
2 _____ 4 _____	2 _____ 4 _____

Parent Material OUTWASH/eolian **Slope** 5 % Elevation 1305 ft Topographic Position concave **Aspect** N

Avg Annual Precip 12 **Recent Weather (last 2 years)** Drought X Normal ___ Wet ___

Describe wildlife and livestock use and recent disturbances ACTIVE ALLOTMENT

Describe offsite influences on area of interest ROAD BELOW SITE

Part 2. Indicator Rating

		Departure from Ecological Site Description/ Ecological Reference Area(s)				
Attribute	**Indicators**	**Extreme**	**Moderate to Extreme**	**Moderate**	**Slight to Moderate**	**None to Slight**
S,H	1. Rills					X
Comments:						
S,H	2. Water Flow Patterns					X
Comments:						
S,H	3. Pedestals and/or Terracettes					X
Comments:						
S,H	4. Bare Ground					X
Comments:						
S,H	5. Gullies					X
Comments:						
S	6. Wind-Scoured, Blowouts, and/or Deposition Areas					X
Comments:						

Green Allotment – Site 2, Sheet 2

Part 2. Indicator Rating (continued)

		Departure from Ecological Site Description/ Ecological Reference Area(s)				
Attribute	**Indicators**	**Extreme**	**Moderate to Extreme**	**Moderate**	**Slight to Moderate**	**None to Slight**
H	7. Litter Movement					X
Comments:						
S,H,B	8. Soil Surface Resistance to Erosion					X
Comments:						
S,H,B	9. Soil Surface Loss or Degradation					X
Comments:						
H	10. Plant Community Composition and Distribution Relative to Infiltration and Runoff					X
Comments:						
S,H,B	11. Compaction Layer					X
Comments:						
B	12. Functional/Structural Groups				X	
Comments:						
B	13. Plant Mortality/Decadence				X	
Comments:						
H,B	14. Litter Amount				X	
Comments:						
B	15. Annual Production					X
Comments:						
B	16. Invasive Plants		X			
Comments:						
B	17. Reproductive Capability of Perennial Plants				X	
Comments:						

S,H,B 18. Biological Crust Integrity X

Part 3. Summary

A. Indicator Summary

Departure from Ecological Site Description/ Ecological Reference Area(s)

	Rangeland Health Attributes	**Extreme**	**Moderate to Extreme**	**Moderate**	**Slight to Moderate**	**None to Slight**	Σ
S	Soil/Site Stability (Indicators 1-6, 8, 9 &11)					𝍸 𝍸	10
H	Hydrologic Function (Indicators 1-5, 7-11 & 14)				1	𝍸 𝍸 1	12
B	Biotic Integrity (Indicators 8-9 & 11-17)		1		1111	𝍸	10

B. Attribute Summary - Check the category that best fits the "preponderance of evidence" for each of the three attributes relative to the distribution of indicator ratings in the preceding Indicator Summary table.

Attribute	**Extreme**	**Moderate to Extreme**	**Moderate**	**Slight to Moderate**	**None to Slight**
Soil/Site Stability Rationale:					X
Hydrologic Function Rationale:					X
Biotic Integrity Rationale:				X	

* Invasive Plants, Functional Groups

Eckman Allotment – Sheet 1

ECKMAN

Rangeland Health Evaluation Summary Worksheet

Part 1. Area of Interest Documentation (**Bold** items require completion, other information is optional)

State WASHINGTON **Office** LARO **Management Unit** KETTLE FALLS

Pasture/Watershed ECKMAN ID# _____ Major Land Resource Area 44

Location (description) Small Bench | Delta From Creek Above Lakeshore 420449 E 5392941. N

Legal T ___ ,R ___ ,Sec ___ , ___ 1/4, ___ 1/4 or Lat ___ ,Long ___ or UTM Coord

Size of Evaluation Area 3 acres **Photo(s) Taken** Yes X No ___

Observer(s) P.B. B.B **Date** 6/24/04

Ecological Site WET MEADOW 15+ PPT R044XY601WA **Soil Map Unit Name** 172 – Peone Silt Loam Stevens Co., Wash.

Soil/Site Verification

Rangeland Ecological Site Description and/or Soil Survey	Area of Interest Determination
Surface Texture _____	Surface Texture _____
Depth: Very Shallow ☐ (<10") Shallow ☐ (10"-20") Moderate ☐ (20"-40") Deep ☐ (>40")	Depth: Very Shallow ☐ (<10") Shallow ☐ (10"-20") Moderate ☐ (20"-40") Deep ☐ (>40")
List diagnostic horizons in profile and depth	List diagnostic horizons in profile and depth
1 OCHRIC 3 _____	1 _____ 3 _____
2 _____ 4 _____	2 _____ 4 _____

Parent Material mixed alluvium **Slope** 1 % Elevation 1297 ft Topographic Position concave **Aspect** N

Avg Annual Precip _____ **Recent Weather (last 2 years)** Drought ___ Normal ___ Wet ___

Describe wildlife and livestock use and recent disturbances Active Allotment, Some Recreational impacts noted,

Describe offsite influences on area of interest – Area provides good day use potential by park visitors – interaction w/ livestock

Part 2. Indicator Rating

		Departure from Ecological Site Description/ Ecological Reference Area(s)				
Attribute	**Indicators**	**Extreme**	**Moderate to Extreme**	**Moderate**	**Slight to Moderate**	**None to Slight**
S,H	1. Rills					X
Comments: None						
S,H	2. Water Flow Patterns				X	
Comments: Greater than expected						
S,H	3. Pedestals and/or Terracettes					X
Comments: None						
S,H	4. Bare Ground				X	
Comments: Greater than Expected						
S,H	5. Gullies			X		
Comments: Large Gully with Head Cut Present at Boundary of Site						
S	6. Wind-Scoured, Blowouts, and/or Deposition Areas					X
Comments:						

Eckman Allotment – Sheet 2

Part 2. Indicator Rating (continued)

		Departure from Ecological Site Description/ Ecological Reference Area(s)				
Attribute	**Indicators**	**Extreme**	**Moderate to Extreme**	**Moderate**	**Slight to Moderate**	**None to Slight**
H	7. Litter Movement					X
Comments:						
S,H,B	8. Soil Surface Resistance to Erosion			X		
Comments:	less than expected -					
S,H,B	9. Soil Surface Loss or Degradation			X		
Comments:	soil sloughing into gully, livestock impacts, Lake Level Fluctuations					
H	10. Plant Community Composition and Distribution Relative to Infiltration and Runoff		X			
Comments:	SPECIES Diversity low - low cover leads to increase runoff					
S,H,B	11. Compaction Layer			X		
Comments:	- Present at 2", some at surface - PLATY STRUCTURE					
B	12. Functional/Structural Groups			X		
Comments:						
B	13. Plant Mortality/Decadence				X	
Comments:						
H,B	14. Litter Amount				X	
Comments:						
B	15. Annual Production				X	
Comments:						
B	16. Invasive Plants		X			
Comments:	REED CANARY GRASS, CANADA THISTLE, RED TOP, WESTERN wheatgrass					
B	17. Reproductive Capability of Perennial Plants				X	
Comments:						

Part 3. Summary

A. Indicator Summary

		Departure from Ecological Site Description/ Ecological Reference Area(s)					
Rangeland Health Attributes		**Extreme**	**Moderate to Extreme**	**Moderate**	**Slight to Moderate**	**None to Slight**	Σ
S	Soil/Site Stability (Indicators 1-6, 8, 9 &11)			IIII	II	III	9
H	Hydrologic Function (Indicators 1-5, 7-11 & 14)		I	III	IIII	III	11
B	Biotic Integrity (Indicators 8-9 & 11-17)		I	IIII	IIII		9

B. Attribute Summary - Check the category that best fits the "preponderance of evidence" for each of the three attributes relative to the distribution of indicator ratings in the preceding Indicator Summary table.

Attribute	**Extreme**	**Moderate to Extreme**	**Moderate**	**Slight to Moderate**	**None to Slight**
Soil/Site Stability Rationale:			X		
Hydrologic Function Rationale: GULLY, LAKE FLUCUATION DROPPED WATER TABLE			X		
Biotic Integrity Rationale:			X		

As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

LARO D-122 April 2005