

Reservation-wide water quality management plans of the water quality standards.

(4). The department shall make a finding that the requirements of this chapter are satisfied if it determines that the project proponent has shown all of the following:

- (a). No practicable alternatives exists which would avoid adverse impacts to wetlands.
- (b). All practicable measures to minimize adverse impacts to the functional values of the affected wetlands have been taken.
- (c). Considering potential wetland functional values provided by any mitigation project that is part of the subject application, that the activity will not result in significant adverse impacts to wetland functional values, significant adverse impacts to water quality or other significant adverse environmental consequences.
- (d). For all activities that will adversely affect a wetland in an area of special natural resource interest, the department may not consider potential functional values provided by any mitigation project that is part of the subject application.
- (e). For all activities that meet the above stipulations, the department must determine that proposed activities comply with the following:
 - (1). The activity is wetland dependent.
 - (2). The surface area of the wetland impact is 0.10 acres or less.
 - (3). All wetlands that may be affected by an activity are less than one acre in size, located outside a 100-year floodplain, and not any of the following types:
 - (i). Wetland area dominated by culturally significant wetland plant species.
 - (ii). Deep marsh.
 - (iii). Ephemeral pond in a wooded setting
 - (iv). Area dominated by a significant population of native species.
 - (v). Mitigation projects and the use of wetland mitigation banks shall be carried out in accordance with water quality standards, and shall follow guidelines as provided by the United States army corps of engineers for mitigation projects and wetland mitigation banks.

PART IV **ANTIDEGRADATION POLICY AND REVIEW PROCESS**

1.4.1 **Antidegradation Policy**

Antidegradation refers to actions taken to maintain existing uses and water quality in the Nation's waters; it allows, in certain cases, lowering of water quality that exceeds 'aquatic life/recreational uses' and provides special protection to waters that constitute a national resource (40 CFR 131.6; 131.12).

The Antidegradation Policy applicable to all surface waters of the Tribe is as follows:

- (1). Tier 1 - Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.
- (2). Tier 2 - Where the quality of the waters exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the Tribe finds, after appropriate intergovernmental coordination and public participation, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In allowing such degradation or lower water quality, the Tribe shall assure water quality adequate to protect existing uses fully. Further, the Tribe shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control.
- (3). Tier 3 – Where high quality waters constitute an outstanding National resource or Tribal resource, such as waters of National and State parks and wildlife refuges and waters of exceptional recreational, ecological, or cultural significance, that water quality shall be maintained and protected.

1.4.2 Antidegradation Review Process

A. Introduction

- (1). These antidegradation procedures provide detailed methods and guidance to be followed by the Department and the Tribal Natural Resources Department in implementing the Tribal antidegradation policy found in Part IV. In all cases, applicable technology and water quality-based requirements are to be implemented in combination with the antidegradation requirements described in this document.
- (2). Implementation of tribal antidegradation requirements serves to promote the maintenance and protection of existing surface water quality. Under this program, all “surface waters” of the tribe are provided one of three different levels of protection. The level of protection that is provided to a specific segment depends upon a number of factors discussed below. At a minimum, all waters are subject to a base level of protection (known as Tier 1 or existing use protection); some waters may qualify only for this level of protection. Antidegradation requirements are triggered whenever a regulated activity is proposed that may have some effect on surface water quality. Such activities are reviewed to determine, based on the level of antidegradation protection afforded to the affected waterbody segment, whether the proposed activity should be authorized.

B. Scope

- (1). The Department will conduct some level of antidegradation review for all “regulated activities” (see definition in Section 1.3.3) that have the potential to affect existing water quality. The specifics of the review will depend upon the waterbody segment that would be affected, the tier of antidegradation applicable to that waterbody segment, and the extent to which existing water quality would be degraded.
- (2). The sequence of steps to be completed by the Department in conducting an antidegradation review is presented in figure 1 (p. 19). In conducting an antidegradation review, the first task that will be addressed by the Department is to determine which tier of antidegradation applies. This is accomplished, as described in detail in figure 1, based on whether the existing quality of the segment is better than necessary to support “aquatic/recreational “ uses.

1.4.3 Tier 3 Procedures

A. Water Qualifving for OTRW Protection

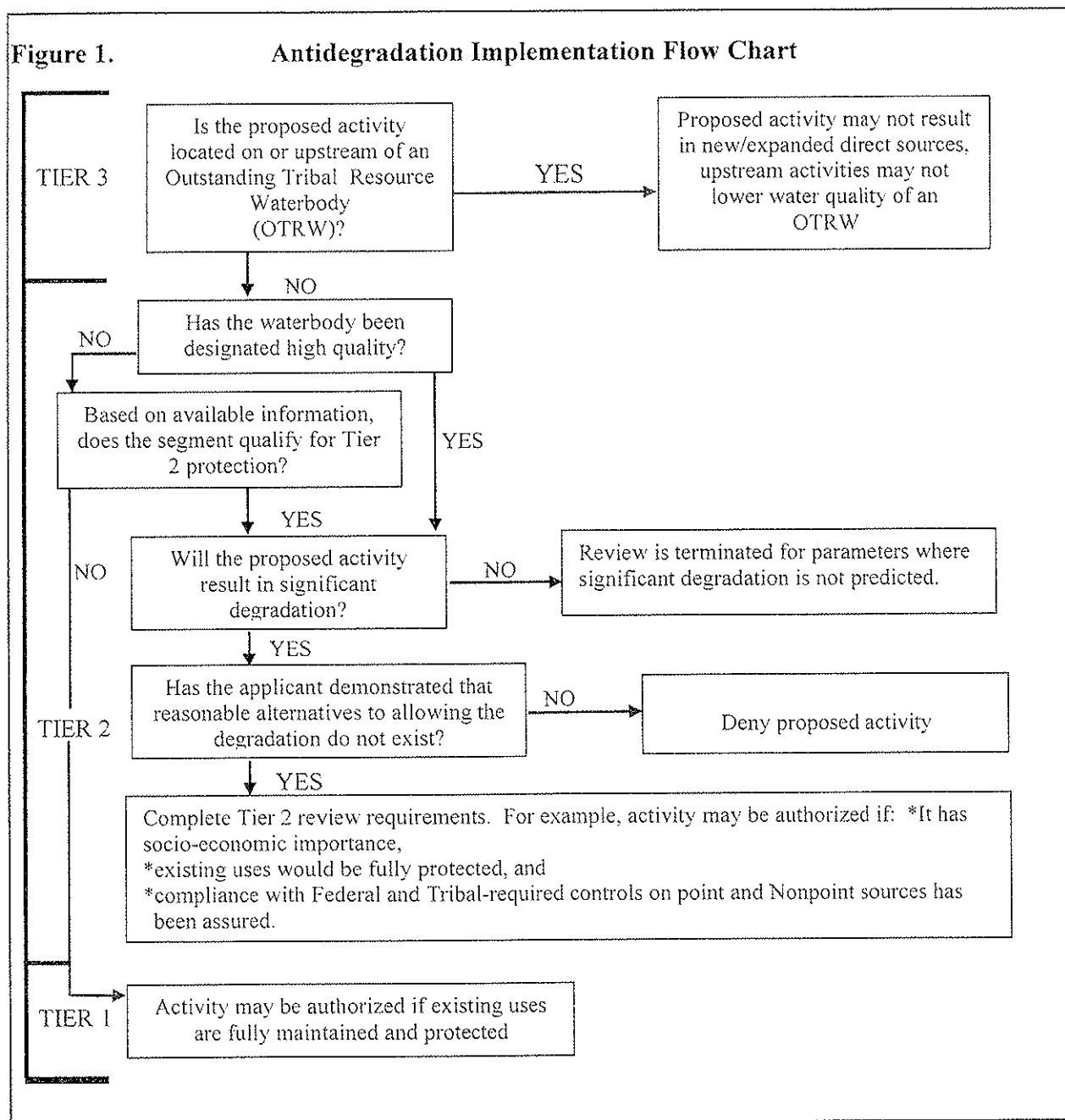
Qualification Criteria: Segments will be subject to Tier 3 protection only where an Outstanding Tribal Resource Water (OTRW) designation has been adopted as a revision to the water quality standards for the segment, consistent with Tribal procedures and EPA requirements. In adopting such a designation, all applicable public participation requirements will be addressed.

(1). Water Quality Requirements

Outstanding water quality is not a prerequisite for OTRW designation. The only requirement is that the segment have outstanding value as an aquatic resource, which may derive from the presence of exceptional scenic or recreational attributes, or from the presence of unique or sensitive ecosystems that have naturally high water quality as measured by conventional parameters, as well as being an important cultural resource for the Tribe. The factors to be considered in determining whether to assign an OTRW designation may include the following:

- (a.) Location : specific guidance to be developed during first triennial review,
- (b.) previous special designations (e.g. wild and scenic river),
- (c.) existing water quality (pristine or naturally-occurring),
- (d.) ecological value (e.g. presence of threatened or endangered species during one or more life stages, reference sited for ecoregions),
- (e.) recreational or aesthetic value (e.g. presence of an outstanding recreational fishery), and

- (f.) other factors that indicate outstanding ecological, cultural, or recreation value (e.g., rare or valuable wildlife habitat, critical ceremonial value). Where determined appropriate, the OTRW designation may be applied to an entire category of waters.



(2). Public Nomination

Public nomination of tribal water(s) for OTRW protection may be submitted by providing a written request to the following address:

Northern Cheyenne Tribe
Environmental Protection Department
ATTENTION: Water Quality
P.O. Box 128
Lame Deer, MT 59043

The written request should explain why an OTRW designation is warranted based on one or more of the factors identified above in Section 1.4.3 A.1.(a – f).

B. Direct Sources to OTRW's

Prohibition of New or Expanded Sources

Any proposed activity that would result in a new or expanded direct source of pollutants to any segment which has been designated as an OTRW is prohibited. This prohibition applies to new sources, expansion of existing sources in which treatment levels are maintained, and expansion of existing sources in which treatment levels are increased to maintain existing pollutant loading levels. Regardless of effluent quality, any new or expanded direct sources is prohibited.

C. Sources Upstream of OTRW's

(1). No Change in Water Quality Allowed

Any proposed activity that would result in a permanent new or expanded indirect source of pollutants (i.e., an upstream source) to an OTRW segment is prohibited except where such source would have no effect on the existing quality of the OTRW segment. Effects on OTRW water quality resulting from upstream sources will be determined based on appropriate techniques and best professional judgment. Factors that may be considered in judging whether OTRW quality would be affected include:

- (a). percent change in ambient concentrations predicted at the appropriate critical condition(s),
- (b). percent change in loadings (i.e., the new or expanded loadings compared to total existing loadings to the segment),
- (c). percent reduction in available assimilative capacity,
- (d). nature, persistence, and potential effect of the parameter,
- (e). potential for cumulative effects, and
- (f). degree of confidence in the various components of any modeling technique utilized (e.g., associated with predicted effluent variability).

(2). Trading

A proposed activity that will result in a new or expanded upstream source may be allowed where the applicant agrees to implement or finance controls of point or nonpoint sources sufficient to offset the water quality effects of the proposed activity. Where such trading occurs upstream of an OTRW segment, Tier 3 requirements will be considered satisfied where the applicant can show that water quality at all points within the study area will be either maintained or improved. The Department, with assistance from EPA, will document the technical rationale for the trade. In some cases, this may be addressed as one element of a Total Maximum Daily Load (TMDL) analysis.

(3). Information Requirements

The applicant may be required to provide information sufficient to evaluate the potential effects of the proposed activity on downstream OTRW's. The information that will be required in a given situation will be identified on a case-by-case basis by the Department.

D. Temporary and Limited Effects

(1). Guidelines

A direct or upstream source that would result in a temporary and limited effect on OTRW water quality may be authorized. Any proposed activity that would result in a temporary source to any segment designated as an OTRW may be allowed and will be reviewed on a case-by-case basis. As a non-binding rule of thumb, activities with durations less than one month and resulting in less than a 5% change in ambient concentration will be deemed to have temporary and limited effects. Decisions on individual proposed activities may be based on the following factors:

- (a.) Length of time during which water quality will be lowered,
- (b.) Percent change in ambient concentrations,
- (c.) Parameters affected,
- (d.) Likelihood for long term water quality benefits to the segment (e.g., as may result from dredging of contaminated sediments),
- (e.) Degree to which achieving applicable water quality standards during the proposed activity may be at risk, and
- (f.) Potential for any residual long term influences on existing uses.

1.4.4 Tier 2 Procedures

A. Waters Qualifying for Tier 2 Procedures

(1). Qualification Criteria

The Department will determine whether a segment qualifies for Tier 2 protection during the antidegradation review of a proposed activity. Such decisions will be based on all relevant information including any ambient water quality (i.e., physical chemical, biological) data submitted by the applicant. The criteria that will be used in identifying high quality Tier 2 water are described in Section 2 below. Unlike the OTRW protection program described above, a revision to water quality standards is not necessary in order for the Department to apply Tier 2 requirements to a segment during the course of an antidegradation review.

(2). Qualification Factors

Decisions regarding whether a waterbody is high quality and subject to Tier 2 protection requirements will be based on a best professional judgment of the overall quality and value of the segment. In general, waters with existing quality that is better than necessary to support aquatic/recreational uses will be considered high quality and subject to Tier 2 requirements. The factors that may be considered in determining whether a segment satisfies the high quality test include the following:

- (a.) Existing aquatic life uses,
- (b.) existing recreational, cultural, or aesthetic uses,
- (c.) existing water quality for all parameters (i.e., subject to the availability of monitoring data or other information for the segment, upstream segments, or for comparable segments), and
- (d.) the overall value of the segment from an ecological and public use perspective.

Note that attainment of both aquatic life (fishable) and recreational (swimmable) uses is not required in order to qualify as a high quality segment.

(3). Presumptive Applicability

In general, it is presumed that a majority of tribal waters qualify for Tier 2 protection. However, there are some waters on the Reservation where neither of the Clean Water Act aquatic/recreational goal uses are attained. It is the intent of these procedures to apply only existing use (Tier 1) protection to such waters. There also may be waters on the Reservation where one or both of the aquatic/recreational uses are attained, but existing water quality is not “better than necessary” to support the goal uses (i.e. assimilative capacity does not exist for a number of parameters). It is the intent of these procedures to apply only existing use (Tier 1) protection to such waters provided that there is no assimilative capacity for each of the parameters to be affected by the proposed activity.

(4). Criteria Exceedences

Occasional exceedences of one or more narrative or numeric water quality criteria may constitute non-attainment sufficient to preclude Tier 2 protection. In waters where exceedences have occurred and continue to occur for one or more parameters, a judgment will be made based on the factors identified above and in consideration of information submitted by the applicant and by the public. As a general operating rule, Tier 2 protection will be applied even where the criteria for some parameters are not always satisfied.

(5). Information Requirements

The applicant may be required to provide monitoring data or other information about the affected waterbody to help determine the applicability of Tier 2 requirements based on the high quality test. The information that will be required in a given situation will be identified on a case-by-case basis. Because these procedures presume that Tier 2 protection requirements will be applied, such information will typically be required of the applicant only where this presumption is in dispute. Such information may include recent ambient chemical, physical, and biological monitoring data sufficient to characterize, during the appropriate critical condition(s), the existing uses and the spatial and temporal variability of existing quality of the segment for the parameters that would be affected by the proposed activity.

(6). Characterizing Existing Quality

The Department will use available water quality data collected by the Department and its sister Tribal Natural Resource Department. This water quality data should be no more than 6 years in age. The Department will collect water column data as well as physical and biological data on the primary streams for triennial review of approved Tribal Water Quality Standards. Characterization of existing quality will appropriately consider spatial and temporal variability. Assimilative capacity will be identified for the appropriate critical condition which, depending on the situation, may be at high or low flow.

B. Significant Degradation

(1). Overview

Once it is determined that Tier 2 protection applies to a waterbody, the next step in the review process is to determine whether the degradation that will result from the proposed activity is significant enough to warrant further review (such as evaluation of alternatives). The factors to be addressed in judging the significance of the proposed activity are

identified in paragraph (2) of this section. Where the significance of the degradation associated with a proposed activity is in dispute, the factors identified in paragraph (2) should also be the focal point of opposing views by the applicant or the public.

(2). Significance Factors

The likelihood that a proposed activity will pose significant degradation will be judged by the Department for all water quality parameters that would be affected by the proposed activity. Such significance judgments will be made on a parameter-by-parameter basis. The Department will identify and eliminate from further review only those proposed activities that present insignificant threats to water quality. Proposed activities will be considered significant and subject to tier 2 requirements where significant degradation is projected for one or more water quality parameters. Because determinations of significant degradation are most appropriately made based on case-specific information, these procedures do not provide rigid decision criteria for judging significant changes in water quality. Rather, significant degradation may be demonstrated with respect to any one (or a combination) of the following factors:

- (a.) Percent change in ambient concentrations predicted at the appropriate critical condition(s),
- (b.) the difference, if any, between existing ambient quality and ambient quality that would exist if all point sources were discharging at permitted loading rates,
- (c.) percent change in loading (i.e., the new or expanded loadings compared to total existing loadings to the segment or, for existing facilities only, the proposed permitted loadings compared to the existing permitted loadings),
- (d.) percent reduction in available assimilative capacity,
- (e.) nature, persistence, and potential effects of the parameter,
- (f.) potential for cumulative effects,
- (g.) predicted impacts to aquatic biota,
- (h.) degree of confidence in any modeling techniques utilized,
- (i.) the difference, if any, between permitted and existing effluent quality, and
- (j.) the duration of the proposed activity or the expected water quality changes.

(aa.) Required Analyses. Based on one or more of the significance factors identified above, the Department may make determinations of significant degradation based on appropriate modeling techniques coupled with detailed characterization of the existing background water quality. However, determinations of significance need not be complicated, data-

sensitive, or resource sensitive. It is not the intent of these procedures to require detailed analyses to address each of the factors identified above. Where appropriate, determinations of significance may be based on simple analyses. For example, proposed activities may be judged as insignificant where:

- (i). available dilution exceeds 100:1,
- (ii). the proposed activity would not result in a significant increase of loadings for any parameter,
- (iii). there is substantial potential for the proposed activity to result in a net long-term water quality benefit to the segment, or
- (iv). the projected water quality changes are temporary and limited.

Likewise, a significant increase in loading for any given parameter may be the basis for concluding that significant degradation will occur.

- (bb.) Persistent Toxics. The significance of proposed new or expanded sources of bioaccumulative or other persistent toxic substances will be judged depending upon, for example, existing loadings of the substances to the segment from all sources. The Department's interpretation of monitoring data or other information indicating fish tissue or sediment accumulation in the watershed will be considered with respect to judging the significance of new or expanded sources of persistent toxic substances.

(3). General Guidelines

As a non-binding rule of thumb, proposed activities that would lower ambient quality of any parameter by more than 5%, reduce the available assimilative capacity by more than 5%, or increase pollutant loadings to a segment by more than 5% will be presumed to pose significant degradation. The intent of this guideline is to establish a de minimis test of significance and to eliminate from further review only those proposed activities that will result in truly minor changes in water quality.

(4). By-passing the Significance Test

Where available information clearly indicates that reasonable non-degrading or less-degrading alternatives to lowering existing water quality exist, the Department may by-pass the significant degradation

requirements and direct the applicant to demonstrate the necessity of the degradation pursuant to Evaluation of Alternatives to Lower Water Quality section below.

(5). Trading

The Department may also conclude that a proposed activity will not pose significant degradation based upon the specifics of any upstream/downstream trading that has been agreed to by the project applicant. The Department, with assistance from the U.S. Environmental Protection Agency, will document the technical rationale for the trade. In some cases, this may be addressed as one element of a Total Maximum Daily Load (TMDL) analysis.

(6). Information Requirements

The applicant may be required to provide monitoring data or other information about the affected waterbody and/or proposed activity to help determine the significance of the proposed degradation for specific parameters. The information that will be required in a given situation will be identified on a case-by-case basis. Because these procedures establish a fairly low threshold of significance, in many cases a large data base will not be necessary to determine that a proposed activity will result in significant degradation. The information required may include recent ambient chemical, physical, or biological monitoring data sufficient to characterize, during the appropriate critical condition(s), the spatial and temporal variability of existing background quality that would result if the proposed activity were authorized. Federal TMDL procedures for characterizing existing water quality and projecting future water quality will be the basis for identifying needed information and interpreting available data.

(7). Determine Significance of Proposed Activity

Proposed regulated activities determined to be significant by the Department shall be subject to the Tier 2 review requirements described below. If the Department determines that an activity will not pose significant degradation for any parameter, no further antidegradation Tier 2 requirements shall apply ; however, such activities must still meet all technology and/or water quality based control requirements or conditions of the permit for the water quality certification.

C. Evaluation of Alternatives to Lower Water Quality

(1). Role of the Environmental Protection Department

The primary emphasis of the Department's Tier 2 antidegradation reviews will be to determine whether reasonable non-degrading or less-degrading alternatives to allowing the proposed degradation are available. The Department will first evaluate any alternatives analysis submitted by the applicant for consistency with the minimum requirements described below. If an acceptable analysis of alternatives was completed and submitted to the Department as part of the initial project proposal, no further evaluation of alternatives will be required of the applicant. If an acceptable alternatives analysis has not been completed, the Department will work with the project applicant to ensure that an acceptable alternatives analysis is developed.

(2). Role of the Applicant

The applicant of any proposed activity that would significantly lower water quality in a high quality segment is required to prepare an evaluation of alternatives. The evaluation is required, at a minimum, to provide substantive information pertaining to the costs and environmental impacts associated with the following alternatives:

- (a.) pollution prevention measures,
- (b.) reduction in scale of the project,
- (c.) water recycle or reuse,
- (d.) process changes,
- (e.) innovative treatment technology,
- (f.) advanced treatment technology,
- (g.) seasonal or controlled discharge options to avoid critical water quality periods,
- (h.) improved operation and maintenance of existing treatment systems, and
- (i.) alternative discharge locations.

(3). Preliminary Determination

Once the Department has determined that feasible alternatives to allowing the degradation have been adequately evaluated, the Department shall make a preliminary determination regarding whether reasonable non-degrading or less-degrading alternatives are available. This determination will be based primarily on the alternatives analysis developed by the project applicant, but may be supplemented with other information or data. As a non-binding rule of thumb, non-degrading or less-degrading pollution control alternatives with costs that are less than 110% of the costs of the pollution control alternatives associated with the proposed activity shall be considered reasonable. If the Department determines that reasonable alternatives to allowing the degradation do not exist, the Department shall continue with the Tier 2 review and document the substance and basis for

that preliminary determination using the antidegradation review worksheet.

(4). If Reasonable Alternative Exist

If the Department makes a preliminary determination that one or more reasonable alternatives to allowing the degradation exists, the Department will work with the project applicant to revise the project design. If a mutually-acceptable resolution cannot be reached, the Department will document the alternative analysis findings and public notice a preliminary decision based on antidegradation Tier 2 requirements, to deny the activity.

(5). Role of the Public

Based upon comments and information received during the public comment period, the Department may reverse its preliminary determination regarding the availability of reasonable alternatives to allowing the degradation.

D. Determination of Socio-Economic Importance

(1). Role of the Applicant

The applicant is required to demonstrate the social and economic importance of the proposed activity. The factors to be addressed in such a demonstration may include, but are not limited to, the following:

- (a.) Employment (i.e., increasing, maintaining, or avoiding a reduction in employment),
- (b.) increased production,
- (c.) improved community tax base,
- (d.) housing, and
- (e.) correction of environmental or public health concerns.

(2). Role of the Environmental Protection Department

Prior to authorizing any proposed activity that would significantly lower the water quality of Tier 2 water, the Department shall ensure that the proposed activity will provide important social or economic development in the area in which the waters of concern are located. In making a preliminary determination, the Department will rely primarily on the demonstration made by the applicant. However, the Department may weigh the applicant's demonstration against counterbalancing socio-economic costs associated with proposed activity, such as projected negative socio-economic effects on the community and projected

environmental effects (i.e., those determined in the significance and/or alternatives analysis decisions processes).

(3). Additional Information Requirements

If information available to the Department is not sufficient to make a preliminary determination regarding the socio-economic costs or benefits associated with the proposed activity, the Department may require the project applicant to submit specific items of information needed to support a determination of importance. The types of information required of the applicant will be determined on a case-by-case basis, but may include:

- (a). Information pertaining to current aquatic life, recreational, or other waterbody uses,
- (b). information necessary to determine the environmental impacts that may result from the proposed activity,
- (c). facts pertaining to the current state of economic development in the area (e.g., population, area employment, area income, major employers, types of business),
- (d). government fiscal base, and
- (e). land use in the areas surrounding the proposed activity.

(4). Mitigation

The applicant may voluntarily submit a proposal to mitigate the adverse environmental effects of the proposed activity (e.g., in-stream habitat improvement, bank stabilization/upgraded riparian vegetation). Such mitigation plans should describe the proposed mitigation measures and the costs of such mitigation. Such a mitigation plan will not release the Department from its obligation to require any reasonable non-degrading or less-degrading alternative in Part C (1) of this procedure, nor will such plans have any effect on the effluent limitations to be included in any NPDES permit (except possibly where a previously-completed mitigation project has resulted in an improvement in background water quality that affects the water quality-based limit). Such mitigation plans will be developed and implemented by the applicant as a means to further minimize the environmental effects of the proposed activity and to increase its socio-economic importance. It is anticipated that an effective mitigation plan may, in some cases, allow the tribe to conclude “importance” and to authorize proposed activities that could otherwise not be authorized pursuant to Tribal antidegradation requirements. Mitigation plans should include criteria for determining success of the mitigation, legal commitment for follow-up monitoring and additional work if necessary, and where practicable, a commitment to implement the mitigation before the project and water quality degradation are allowed.

(5). Preliminary Determination

Once the Department has reviewed available information pertaining to the socio-economic importance of the proposed activity, the Department shall make a preliminary determination regarding importance. If the Department determines that the proposed activity has social or economic importance in the area in which the affected waters are located, the Department shall continue with the Tier 2 review and document the substance and basis for that preliminary determination using the antidegradation review worksheet.

(6). If Importance is Found Lacking

If the Department makes a preliminary determination that the proposed activity does not have social or economic importance in the area in which the affected waters are located, the Department will document these findings and provide public notice of their preliminary decision to deny the proposed activity.

(7). Role of the Public

Because the socio-economic importance of a proposed activity is a question best addressed by local interests, the Department will give particular weight to the comments submitted by local governments, land use planning authorities, and other local interests in determining whether the balancing of benefits and costs that was the basis for the Department's preliminary decision was appropriate. Based upon comments and information received during the public comment period, the Department may reverse its preliminary determination regarding the social or economic importance of a proposed activity.

E. Ensure Full Protection of Existing Uses

See Part 1.4.5

Prior to authorizing any proposed activity that would significantly degrade Tier 2 waters, the Department shall ensure that existing uses will be fully protected consistent with the Tier 1 implementation procedures provided below.

F. Ensure Implementation of Tribal-Required Point and Nonpoint Source Controls

(1). Role of the Environmental Protection Department

Prior to authorizing a regulated activity that would significantly degrade a Tier 2 water, the Department shall determine that compliance with

required controls on all point and nonpoint sources in the zone of influence has been assured. This requirement is intended to ensure that regulated activities that will result in water quality degradation for a particular parameter will not be authorized where there are existing unresolved compliance problems involving the parameter in the zone of influence of the proposed activity. The 'zone of influence' is determined as appropriate for the parameter of concern, the characteristics of the receiving waterbody (e.g., lake versus river, etc.), and other relevant factors. Where available, a Total Maximum Daily Load analysis or other watershed-scale plan will be the basis for identifying the appropriate zone of influence. The Department may conclude that such compliance has not been assured where facilities are in noncompliance with their NPDES permit limits. However, the existence of schedules of compliance for the purposes of NPDES permit requirements will be taken into consideration in such cases. Where there are nonpoint sources that are regulated activities, the Department shall determine that any tribal-required control or best management practices have been achieved or that a plan that assures such compliance has been developed. In other words, required control on existing regulated sources in the area need not be finally achieved prior to authorizing a proposed activity provided there is reasonable assurance of future compliance.

(2). Preliminary Determination

Based upon available data or other information, the Department will make a preliminary determination regarding whether compliance with required controls on point and nonpoint sources in the zone of influence has been assured.

(a). Controls have been Assured

If the preliminary determination is that such compliance has been assured, the Department shall continue with the Tier 2 review and document the substance and basis for that preliminary determination using the antidegradation review worksheet (see Appendix E).

(b). Controls have not been Assured

If the Department makes a preliminary determination that compliance with required point and nonpoint source controls has not been assured, the Department shall document that antidegradation review finding and public notice a preliminary decision based upon Tier 2 requirements, to deny the proposed activity.

(3). Role of the Public

Based upon comments and information received during the public comment period, the Department may reverse its preliminary finding regarding the degree to which compliance with required point and nonpoint source controls has been assured.

1.4.5 TIER 1 PROCEDURES

A. Water Qualifying for Tier 1 Protection

Waters Subject to Tier 1 Requirements

All waters are subject to Tier 1 protection. Those which are only subject to Tier 1 protection are those waters that have not been assigned an OTRW designation, and that do not currently possess the overall water quality or value necessary to meet the high quality test. In general, Tier 1-only waters are those segments where fishable/swimmable goal uses are not attained, or where assimilative capacity does not exist for any of the parameters that would be affected by the proposed activity.

B. Two-Part Requirement

Protect Water Quality and Uses

The Tribal antidegradation policy requires that existing uses, and the water quality necessary to protect existing uses, shall be maintained and protected. This requirement contains two parts:

- (a.) Protection of existing uses, and
- (b.) protection of the water quality necessary to maintain and protect existing uses.

C. Ensure Water Quality Necessary to Maintain and Protect Existing Uses

(1). Confirm that Designated Uses Address Existing Uses

Prior to authorizing any proposed activity, the Department shall ensure that water quality sufficient to fully protect existing uses will be achieved. An important decision that must be made by the Department is whether the waterbody currently supports, or has supported since November 28, 1975, an existing use that has more stringent water quality requirements than the current designated uses. In making this decision, the Department will focus on whether a higher designated use (i.e., based on Tribal use designations) should be assigned to the waterbody to reflect an existing use. Where the Department determines that the current designated uses appropriately reflect the existing waterbody uses, the Department shall document that preliminary determination using the antidegradation review worksheet. In such cases, the water quality control requirements necessary

to protect designated uses will be presumed to also fully protect existing uses. Where the designated uses are found to be appropriate, but there is clear and convincing evidence that the numeric criteria adopted for the protection of designated uses would not adequately protect existing uses, the Tribe may either apply more stringent numeric criteria that will protect existing uses (where defensible criteria are readily available), or pursue development of criteria that will protect existing uses. The applicant may be required to assist with any needed studies. The Department will apply appropriate, defensible criteria as necessary to protect existing uses, and propose any needed revisions to the water quality standards for the affected segments at the earliest rulemaking opportunity.

(2). Where Designated Uses do not Address Existing Uses

The procedure outlined in paragraph (1) above will ensure that designated uses appropriately address existing uses pursuant to tribal and federal requirements. Where this is not the case, a revision to tribal standards may be needed since, pursuant to the tribal and federal water quality standards regulations, designated uses are required to reflect, at a minimum, all attainable (including currently attained, or existing) uses. Where existing uses with more stringent protection requirements than currently designated uses are identified, the Department will ensure levels of water quality necessary to protect existing uses fully and, at the earliest opportunity, propose that appropriate revision to the designated uses be adopted into the Tribal water quality standards. However, the Department will not delay Tier 1 protection pending the reclassification action.

(3). Require Water Quality Necessary to Protect Existing Uses

Where the Department determines that the water body currently supports, or has supported since November 28, 1975, an existing use that has more stringent water quality requirements than the current designated uses, the Department shall identify the level of water quality necessary to protect existing uses fully for the parameters in question. The Department's estimate of the level of water quality required will be based on numeric Tribal water quality criteria, narrative tribal criteria, and/or federal criteria guidance. In general, water quality sufficient to maintain and protect existing uses for the parameters in question will be assured using the same procedures that would have been followed had the water quality standards (i.e., uses and criteria) been appropriately assigned to begin with. The preliminary finding regarding existing uses and the level of water quality necessary to protect existing uses will be documented using the antidegradation review worksheet.

(4). Trading

The procedures outlined above describe one way in which a new or expanded discharge can be allowed consistent with Tier 1 requirements. If, for example, existing water quality for a given parameter exceeds the criteria determined appropriate for the protection of existing uses (as determined above), one option to meet Tier 1 requirements would be to require a new or expanded discharge to meet those criteria at the end of pipe, or some other effluent requirement that is specified in a Total Maximum Daily Load. As an alternative, a proposed activity that will result in a new or expanded source could also be allowed where the applicant agrees to implement or finance upstream controls of point or nonpoint sources sufficient to protect existing uses fully. Under such a trading arrangement, the effluent limits for the new or expanded source may be less stringent than criteria at the end-of-pipe, provided that the net effect of the trade is for the level of water quality necessary to protect existing uses will be achieved. The Department, with assistance from the U.S. Environmental Protection Agency, will document the technical rationale for the trade. In some cases, this may be addressed as one element of a Total Maximum Daily Load analysis.

(5). Additional Information Requirements

The applicant may be required to provide monitoring data or other information about the affected waterbody to help determine whether designated uses also reflect existing waterbody uses. The applicant may also be required to provide information that will assist in determining the level of water quality necessary to protect existing uses fully. The information that will be required in a given situation will be identified on a case-by-case basis. Because these procedures presume that designated uses reflect existing uses, such information will typically be required only where this presumption is in doubt, based on the information available to the Department. Where this presumption is in doubt, the applicant may be required to provide physical, chemical, and biological monitoring data or other information needed by the Department to identify and protect existing uses.

D. Ensure Full Protection of Existing Uses

(1). Presume that Applicable Criteria Will Protect Uses

The procedures just discussed presume that implementation of the water quality criteria established to protect designated uses will also incidentally protect existing uses. However, situations may arise where a proposed (regulated) activity will impair or eliminate an existing use in a manner that cannot readily be predicted with the water quality criteria established to protect designated uses. Examples include situations where appropriate and specific water quality criteria are not yet in place (e.g., impacts to

aquatic life habitat that may result from the discharge of “clean” sediment).

(2). Where Applicable Criteria Will Not Protect Existing Uses

Where the Department concludes that existing uses will be impaired by a regulated activity, the Department will work with the project applicant to revise the project design such that existing uses will be maintained and protected. If a mutually-acceptable resolution cannot be achieved, the Department will document the basis for its preliminary determination regarding the loss or impairment of existing uses that will occur using the antidegradation review worksheet, identify appropriate control requirements, up to and including denial of the proposed activity, and public notice its preliminary decision. Where possible, such effects will be predicted based upon quantitative methods. In predicting effects, the Department will use all information submitted by the applicant, available modeling techniques, and best professional judgment based upon experience with similar types of projects, as appropriate.

(3). Where Loss or Impairment of Existing Uses Is Not Predicted

Where the Department determines that implementation of the applicable water quality criteria will fully protect the existing uses, that finding will be documented using the antidegradation worksheet.

1.4.6

DOCUMENTATION, PUBLIC REVIEW, AND INTERGOVERNMENTAL COORDINATION PROCEDURES

A. Documentation of Antidegradation Review Findings

Antidegradation Worksheet

The Department will complete an antidegradation review for all proposed regulated activities that may have some effect on surface water quality. The findings of all antidegradation reviews will be documented using an antidegradation worksheet, a copy of which is in Appendix E.

B. Public Review Procedures

(1). Public Notice Requirements

Generally, the regulated activities triggering an antidegradation review will be generated by other federal agencies including but not limited to the U.S. Environmental Protection Agency, the U.S. Army Corps of Engineers, the Bureau of Indian Affairs, and the Bureau of Reclamation. As part of the public notice requirements for these agencies, the Department will provide a copy of the antidegradation worksheet which

may be incorporated into the public notice issued by these cooperating agencies. Where an antidegradation review results in the identification of water quality protection requirements that may affect activities other than the proposed activity under review (e.g., the review identifies an existing use that is not currently designated or a numeric criterion that is not stringent enough to protect an existing use), the Tribe will make a reasonable effort to inform potentially affected entities located on and off the reservation so that they have an opportunity to review and comment on the basis for the Department's antidegradation review.

(2). Content of Public Notice

If the Tribe takes an action without a federal partner, a public notice will be prepared and notice placed in local major newspapers such as the Billings Gazette, Hardin Tribune, or Rosebud County Press, for two weeks with comments taken for two weeks after the notice is run in newspapers. In preparing the public notice, the Department shall:

- (a.) Outline the substance and basis of the Tribe's antidegradation review conclusions, including the preliminary finding regarding whether to authorize the proposed activity,
- (b.) request public input on particular aspects of the antidegradation review that might be improved based on public input (e.g., existing uses of the waterbody by the public, the preliminary determination on socio-economic importance),
- (c.) provide notice of the availability of the antidegradation review worksheet,
- (d.) provide notice of the availability of any introductory public information regarding the state antidegradation program, and
- (e.) include a reference to the Tribe's antidegradation policy.

C. Intergovernmental Coordination Procedures

Minimum Process

- (a.) At a minimum, the Department will provide copies of the completed antidegradation review worksheet and/or the public notice to appropriate tribal, state, and federal government agencies along with a written request to provide comments by the public comment deadline.

PART V. MIXING ZONE AND DILUTION POLICY

1.5.1 Mixing Zones and Dilution Allowances

Mixing zones are regions surrounding or downstream of a point source discharge in which the discharge is progressively diluted by the receiving water and numerical water quality criteria may not apply. This policy describes how dilution and mixing of point source discharges within receiving waters will be addressed in developing discharge limitations for point source discharges.

A. **The Mixing Zone and Dilution Policy applicable to all surface waters of the Tribe is as follows:**

(1). Mixing Zones

- (a) Where justified based on site-specific considerations and where the discharge does not mix at a near instantaneous and complete rate, mixing zones may be designated. Mixing zones are not authorized for discharges to lakes, reservoirs, and wetlands. Each mixing zone will be developed on a case-by-case basis to protect the most sensitive designated use, consistent with the latest EPA guidance. Individual mixing zones may be limited or denied when the following concerns in the area affected by the discharge have been considered:
 - (i) Bioaccumulation in fish tissues or wildlife;
 - (ii) biologically important areas such as fish spawning/nursery areas or segments with occurrences of federally listed threatened or endangered species;
 - (iii.) low acute to chronic ratio;
 - (iv.) potential human exposure to pollutants resulting from drinking water or recreational activities;
 - (v.) attraction of aquatic life to effluent plume;
 - (vi.) toxicity/persistence of the substance discharged;
 - (vii.) zone of passage for migrating fish or other species (including access to tributaries), and
 - (viii.) cumulative effects of multiple discharges and mixing zones (e.g., on a watershed scale, mixing zones should not total more than 10% of all river/stream miles).
- (b) Effluent limits will be assigned consistent with mixing zone size limits determined by field study, an appropriate mixing model, or other defensible method.
- (c) Chronic mixing zones shall not exceed one-half of the cross-sectional area or a length ten times the stream width at critical low flow, whichever is more limiting. Mixing zones for chemical-specific acute criteria, or zones of initial dilution, may not exceed 10% of the chronic mixing zone volume or flow. Mixing zones for purposes of developing acute whole effluent toxicity effluent limitations are not authorized.

- (d) Narrative Water Quality Criteria defined in Section 1.3.5 A. (1), (2), (3), and (5) are applicable with mixing zones.

(2). Dilution Allowances

- (a). For discharges to rivers and streams where it is reasonable to conclude that the discharge mixes in near instantaneous and complete manner, a dilution allowance equal to or less than the critical low flows identified in Part IX 1.9.1(6) may be provided for purposes of developing acute and chronic chemical-specific and whole effluent toxicity effluent limitations. For minor POTW's where the discharge does not mix in a near instantaneous and complete manner, such dilution allowances may also be provided for purposes of developing acute whole effluent toxicity effluent limitations. For intermittent discharges, such as lagoon facilities that discharge during high ambient flow, the stream flow to be used in the mixing zone analysis should be the lowest flow expected to occur during the period of discharge.
- (b). Near instantaneous and complete mixing may be assumed where the mean daily flow of the discharge exceeds the critical low flow of the receiving water, or where an effluent diffuser has been installed. In all other cases where instantaneous and complete mixing is assumed, a defensible basis will be included in the statement of basis for the permit. For purposes of field mixing studies, near instantaneous and complete mixing is defined as no more than 10% difference in bank-to-bank concentrations within a longitudinal distance not greater than 2 stream/river widths.

(3). Other Considerations

- (a) Where dilution flow is not available at critical conditions, the discharge limits will be based on achieving applicable water quality criteria at the end-of-pipe, and neither a mixing zone or an allowance for dilution will be provided.
- (b) All mixing zone dilution assumptions are subject to review and revisions as information on the nature and impacts of the discharge becomes available (e.g., chemical and biological monitoring in the mixing zone boundary). Where justified, the discharger may be required to conduct in-stream monitoring to verify that mixing zone restrictions are being achieved. At a minimum, mixing zone and dilution decisions are subject to review and revision along with all other aspects of the discharge permit upon expiration of the permit.

- (c) For certain pollutants (e.g., ammonia, dissolved oxygen, metals) that may exhibit increased toxicity or other effects on water quality after dilution and complete mixing with receiving waters is achieved, the wasteload allocation shall address such toxicity or other effect on water quality as necessary to fully protect beneficial uses (i.e., the point of compliance may be something other than the mixing zone boundary or the point where complete mixing is achieved).

Dilution allowances shall be developed considering guidance issued by EPA, including the EPA Region VIII Mixing Zone and Dilution Policy. Critical low flows for use in developing dilution allowances are specified in the Tribe's critical conditions policy.

1.5.2

Narrative Toxic Standards Implementation (Reserved)

Note: Narrative toxic standards will be developed as part of the mixing zone policy and will be prepared accordingly. Procedures will address various mechanisms used to implement water quality-based controls (chemical-specific, and biological standards components), as well as how these mechanisms will be integrated to protect designated uses. Implementation is expected to follow EPA guidance documents and 40 CFR 131.11 (a)(2).

PART VI.

COMPLIANCE WITH STANDARDS

1.6.1

Investigation of Reported or Suspected Non Compliance

The Department will forthwith investigate compliance with the standards and criteria for surface water quality and other provisions contained in these rules whenever it:

- (1). Receives notice of a suspected exceedance or the written request of any person to investigate and take action upon any suspected violation of any requirement hereunder;
- (2). possesses reliable information, as a result of Department sampling or otherwise, giving the Department reason to believe that an exceedance of these standards or criteria has occurred or that a water body or segment thereof has been, or may be, degraded.

PART VII. COMPLIANCE PROCEDURES, REQUIREMENTS, AND ORDERS (RESERVED)

Until such time as a Tribal Water Quality Management Ordinance is adopted for the Northern Cheyenne Reservation this section shall be consistent with procedures in the Tribal Administrative Procedures Ordinance, Part II, Section 3.

PART VIII.

401 CERTIFICATION

1.8.1 **Introduction**

Section 401 of the Federal Water Pollution Control Act (Clean Water Act or CWA) requires that applicants for a Federal license or permit relating to any activity which may result in any discharge into navigable waters (i.e., waters of the United States) shall obtain a certification from the responsible governmental authority that such discharge will comply with the applicable provisions of sections 301, 302, 303, 306, and 307 of the Clean Water Act.

1.8.2 **Purpose**

The purpose of this regulation is to establish procedures for application, public notice and hearing in relation to the processing of applications for certification required by section 401 of the CWA.

1.8.3 **Definitions**

In this Part, the following terms have the meanings indicated below:

- (1). “Applicant” for purposes of the CWA, 401 certification means any person who applies for a license or permit issued by an agency of the federal government to conduct an activity that may result in a discharge of a pollutant to Reservation surface waters or wetlands.
- (2). “Certification” means a letter of approval, denial or approval with conditions of an application for certification issued by the Environmental Protection Department of the Northern Cheyenne Tribe.
- (3). The definitions of other terms used in these regulations shall be consistent with those used in Tribal Administrative Procedures Ordinance , the Federal Clean Water Act and its implementing regulations. In the case of ambiguity, words will be given their ordinary meaning.

1.8.4 **Authority to Act**

A certification, certification with conditions, or denial of certification with conditions or alternatives shall be issued in letter form, but must be assigned a docket number and retained as a part of the Department’s official records. Such letters must be signed by a duly authorized agency official which for purposes of this rule includes the head of the Environmental Protection Department or persons duly authorized to act for him/her in his/her absence.

1.8.5 **Application**

- (1). No discharge of pollutants or construction of any facility which may precipitate a discharge of pollutants to Reservation surface waters, including wetlands, may commence without first obtaining a written certification of such discharge as described herein.
- (2). Application for certification may be made upon a form supplied by the Environmental Protection Department or in any manner which adequately and accurately describes the applicant's name and address, a description of the proposed point source or activity, its volume, biological, chemical, physical and radiological characteristics, a description of the existing environmental conditions at the site of the proposed discharge, its location and duration and extent of the proposed discharge. The applicant shall also supply the Department with the size of the area potentially affected, the location or locations at which the discharge may enter Reservation waters and any environmental impact assessment, information, maps and/or photographs provided to any licensing or permitting agency, the date or dates of the proposed activity's inception and termination, a description of the methods proposed to monitor the quality and characteristics of the discharge and operation of the facility from which the discharge will originate and a description of the functions and operation of the activity and any practices proposed to minimize or treat pollutants or other effluent which may be discharged into Reservation waters.
- (3). In cases where a CWA 402 permit application has been made to the U.S. Environmental Protection Agency or a CWA 404 permit application has been made to the U.S. Army Corps of Engineers, the applicant may submit a complete copy of that permit application to the Environmental Protection Department in lieu of subsection (2) above, but may be requested by the Department to supply such additional information as may be reasonably required to afford it sufficient information to make a certification decision in conformity with the Clean Water Act.
- (4). Upon receipt of an application for certification, the Department shall make a record of the date of its receipt. If upon examination the application is found to be defective or incomplete, it will promptly be returned to the applicant for correction or completion, and the date and reasons for the return shall be marked on a copy of the application and made of record in Department files. The applicant shall be notified of the deficiencies by certified mail within 30 days of receipt of the application. The applicant shall have another 30 days from notification of the incomplete application to supply complete information to the Division or face rejection of the application. If no response or a grossly inadequate response is received by the Department, the application shall be deemed to have been withdrawn by the applicant. In addition, an untimely response may not be considered by the Department although any applicant may reapply for certification at any time.

- (5). Within thirty (30) days of submission of a complete application and supporting scientific and technical information to the Department for review by a duly authorized board or commission, the Department may either grant, deny, or grant with conditions the application for 401 certification. Response from the duly authorized board or commission to the submitted application may be extended an additional forty-five (45) days upon determination that the time provided is insufficient to carry out consultation and technical review of an application.
- (6). If the Department accepts the application and later determines that additional information is required before a certification decision can be made, such information may be required at a later date without rejecting the application. Once a complete application for certification is received by the Department, it shall be granted, denied or granted with conditions or alternatives.
- (7). The Department shall issue a statement of its reasons for denial of certification in writing to the applicant and such statement shall be made a part of the Department's official record with regard to the application.
- (8). The Department's decision as to any complete application for certification shall constitute an "agency action" within the meaning of the Tribal Administrative Procedures Ordinance and may be appealed according to the terms of that Ordinance. Any person aggrieved by the Department's final determination with respect to grant, denial of grant or grant of certification with conditions or alternatives may be appealed as set forth in the Tribal Administrative Procedures Ordinance.

1.8.6

Public Notice and Public Hearings

Public notice of an application shall be performed in relation to all applications, as follows:

- (1). By mailing notice of the application for certification to persons and organizations who have requested the same and to all others deemed appropriate.
- (2). When determined by the Department as necessary to protect the public interest, by publication of notice as set out in the Tribal Administrative Procedures Ordinance. However, certification action shall not be construed to constitute rulemaking proceedings for any other purpose. The publication shall be made on a form approved by the Department, as appropriate, and the applicant shall arrange for publication and bear the cost of such publication and provide an affidavit of publication to the Department.

- (3). Any person desiring to present views on an application in relation to water pollution control considerations shall do so by providing the same in writing to the Department, whichever is identified in the last published notice, or such longer period of time as the Department may determine. In cases where the Department has elected to seek public comment on an application, no application may be deemed complete until the public comment period and hearing, if any, has been completed.
- (4). If the Department determines there is sufficient public interest in any application, a public hearing for the informal submission of informal oral or written testimony may be held. When this determination is made before notice of application as set out at (1), the notice shall include the time and place of the hearing. Otherwise, a separate notice of public hearing shall be made and such notice shall be distributed and published in the manner provided above, at the sole expense of the applicant. In addition, it shall be the applicant's responsibility to obtain Departmental approval of all notices referenced herein and to arrange for publication of same.

PART IX. STANDARDS IMPLEMENTATION

1.9.1 Requirements

- (1). All federal licenses and permits, such as permits for wastewater discharges issued under the National Pollution Discharge Elimination System (NPDES), shall be conditioned in such a manner as to authorize only activities that will not cause violations of these water quality standards. For new standards, revised standards that have become more stringent, or new interpretations of existing standards, schedules of compliance may be included in such permits where appropriate. Compliance schedules will be developed considering guidance issued by the EPA.
- (2). These water quality standards apply to all waters affected by nonpoint sources of pollution. At this time, the Tribe intends to rely on voluntary compliance for activities which result in nonpoint sources of pollution but do not require a federal license or permit. All appropriate combinations of individual best management practices should be applied to avoid violation of tribal water quality standards.
- (3). Until such time as the Tribe receives eligibility to implement Section 402 of the Clean Water Act, discharge permits will be issued by the EPA to comply with the Tribal water quality standards. All discharge permit applications will be reviewed by both the Tribe and EPA. The Tribe has the authority to deny certification of any discharge into reservation waters as described in paragraph 5 of this section if the Tribe determines that the proposed discharge would cause violation of the Tribal water quality standards.

The Tribe will assist with compliance inspection of all permitted facilities on the Reservation. Inspection results will be submitted to the EPA for review of compliance. The EPA will also have the responsibility of enforcing NPDES permit violations. However, under the Clean Water Act the Tribe may initiate citizen suits pursuant to section 505 against the EPA or the permittee to correct permit violations.

- (4). The Tribe reserves the right to identify, in a water quality certification, specific water quality standards implementation methods to be used in developing water quality-based point and nonpoint source control requirements. All Controls shall be developed using technically-defensible methods such as those described in EPA guidance documents. These water quality standards will serve as the basis for any § 303(d) total maximum daily loads (TMDLs) developed for Tribal waters.
- (5). All activities which require a federal license or permit on the Reservation are subject to certification by the Tribe consistent with § 401 of the Clean Water Act. In Implementing this authority, and depending upon specific facts, the Tribe may decide to certify unconditionally, deny certification, or certify with conditions. Conditional certifications shall specify water quality protective conditions, best management practices, or monitoring requirements that must be implemented by the applicant. Where the Tribe determines that the conditions specified in a certification are not being implemented, or that an activity for which a certification was previously issued is causing a violation or contributing to a violation of the Tribal water quality standards, the Tribe may suspend or revoke a certification pending corrective actions by the applicant, deny certification upon expiration and reissuance of the permit, or initiate a citizen suit consistent with CWA § 505.
- (6). Critical Conditions Policy
 - (a.) For purposes of determining water quality based control requirements for point source discharges, critical conditions shall be determined consistent with the policy and procedure described below, where a steady state modeling approach is used. Where seasonal controls are appropriate, critical conditions shall be determined based on seasonal characteristics of the receiving water and pollution source. Other exceptions may be granted where a technically sound reason to use an alternative method is developed and approved by the Department (e.g. where a dynamic or continuous simulation modeling method is used). Critical conditions shall be representative of conditions upstream from the point where the discharge exists.

(i.) Stream Flow¹

Aquatic life, Chronic	4-day, 3-year flow (biologically based)
Aquatic life, acute	1-day, 3-year flow (biologically based)
Human health (carcinogens)	Harmonic mean flow
Human health (non-carcinogens) ²	4-day,3-year flow (biologically based) or
Human health (non-carcinogens)	1-day, 3-year flow (biologically based)

(ii) Effluent Flows

Aquatic life, Chronic	Mean daily flow
Aquatic life, acute	Maximum daily flow
Human health (all)	Mean daily flow

- (iii) Temperature and pH (for effluent and receiving waters)
80th percentile of all samples that are representative of the site.
- (iv) Hardness (for effluent and receiving waters)
20th percentile of all samples that are representative of the site.
- (v) Ambient Quality
Dissolved Oxygen – the 20th percentile of all samples that are representative of the site.
Fecal Coliform – the geometric mean of available data.
Others – the 80th percentile of all samples that are representative of the site.

¹Application of these low flows in determining dilution assumptions is subject to application of the Tribe's mixing zone and dilution policy.

²For human health non-carcinogens, a distinction is made between parameters that typically have an effect after prolonged exposure(e.g. copper) and those that have more of an immediate effect(e.g. nitrate). The chronic aquatic life flow shall be used for the longer-lasting parameters and the acute aquatic life flow for the shorter-acting parameters.

APPENDIX A

TRIBAL NUMERIC CRITERIA CHARTS

NORTHERN CHEYENNE TRIBE

Numeric Water Quality Standards Chart for Priority Pollutants

(Footnotes A-O)

Priority Pollutants	CASRN	Freshwater-Aquatic Life:		Human Health for Consumption of:	
		ACUTE (CMC) (µg/L)	CHRONIC (CCC) (µg/L)	Water + Organism (µg/L)	Organism only (µg/L)
1. Antimony	74403060			5.6	640
2. Arsenic	7440382	340 ^A	150 ^A	0.018 ^{B,L}	0.14 ^{B,L}
3. Beryllium	7440417			F	F
4. Cadmium	7440439	2.0	0.27 ^{C,P}	F	F
5a. Chromium III	16065831	1804 ^{C,P}	74 ^{C,P}	F	F
5b. Chromium VI	18540299	16 ^P	11 ^P	F	F
6. Copper	7440508	13 ^{C,N,P}	9.0 ^{C,N,P}	1,300	
7. Lead	7439921	82 ^{C,P}	3.2 ^{C,P}	F	F
8. Mercury	7439976	1.7 ^{O,P}	0.012 ^{O,P}	0.050	0.051
9. Nickel	7440020	470 ^{C,P}	52 ^{C,P}	610	4,600
10. Selenium	7782492	^G	5.0	170	4,200
11. Silver	7440224	4.1 ^{C,E,P}	0.12 ^P		
12. Thallium	7440280			0.24	0.47
13. Zinc	7440666	120 ^{C,P}	120 ^{C,P}	7,400	26,000
14. Cyanide	57125	22 ^{K,P}	5.2 ^{K,P}	140	140
15. Asbestos	1332214			7 million fibers/L	
16. 2,3,7,8-TCDD Dioxin	1746016			5.0 E ⁻⁹ ^B	5.1 E ⁻⁹ ^B
17. Acrolein	107028			190	290
18. Acrylonitrile	107131			.051 ^B	.25 ^B
19. Benzene	71432			2.2 ^B	51 ^B
20. Bromoform	75252			4.3 ^B	140 ^B
21. Carbon Tetrachloride	56235			0.23 ^B	1.6 ^B
22. Chlorobenzene	108907			130	1,600
23. Chlorodibromomethane	124481			0.40 ^B	13 ^B
24. Chloroethane	75003				
25. 2-Chloroethylvinyl Ether	110758				
26. Chloroform	67663			5.7 ^B	470 ^B
27. Dichlorobromomethane	75274			0.55 ^B	17 ^B
28. 1,1-Dichloroethane	75343				
29. 1,2-Dichloroethane	107062			.38 ^B	37 ^B
30. 1,1-Dichloroethylene	75354			330 ^B	7,100 ^B
31. 1,2-Dichloropropane	78875			0.50 ^B	15 ^B

Priority Pollutants	CASRN	Freshwater-Aquatic Life:		Human Health for Consumption of:	
		ACUTE (CMC) (µg/L)	CHRONIC (CCC) (µg/L)	Water + Organism (µg/L)	Organism only (µg/L)
32. 1,3-Dichloropropene	542756			0.34	21
33. Ethylbenzene	100414			530	2,100
34. Methyl Bromide	74839			47	1,500
35. Methyl Chloride	74873			F	F
36. Methylene Chloride	75092			4.6 ^B	590 ^B
37. 1,1,2,2-Tetrachloroethane	79345			0.17 ^B	4.0 ^B
38. Tetrachloroethylene	127184			0.69 ^B	3.3 ^B
39. Toluene	108883			1,300	15,000
40. 1,2-Trans-Dichloroethylene	156605			140	10,000
41. 1,1,1-Trichloroethane	71556			F	F
42. 1,1,2-Trichloroethane	79005			0.59 ^B	16 ^B
43. Trichloroethylene	79016			2.5 ^B	30 ^B
44. Vinyl Chloride	75014			0.025 ^B	2.4 ^B
45. 2-Chlorophenol	95578			81	150
46. 2,4-Dichlorophenol	120832			77	290
47. 2,4-Dimethylphenol	105679			380	850
48. 2-Methyl-4,6-Dinitrophenol	534521			13	280
49. 2,4-Dinitrophenol	51285			69	5,300
50. 2-Nitrophenol	88755				
51. 4-Nitrophenol	100027				
52. 3-Methyl-4-Chlorophenol	59507				
53. Pentachlorophenol	87865	19 ^D	15 ^D	0.27 ^B	3.0 ^B
54. Phenol	108952			21,000	1,700,000
55. 2,4,6-Trichlorophenol	88062			1.4 ^B	2.4 ^B
56. Acenaphthene	83329			670	990
57. Acenaphthylene	208968				
58. Anthracene	120127			8,300	40,000
59. Benzidine	92875			0.000086 ^B	0.00020 ^B
60. Benzo(a)Anthracene	56553			0.0038 ^B	0.018 ^B
61. Benzo(a)Pyrene	50328			0.0038 ^B	0.018 ^B
62. Benzo(b)Fluoranthene	205992			0.0038 ^B	0.018 ^B
63. Benzo(g,h,i)Perylene	191242				
64. Benzo(k)Fluoranthene	207089			0.0038 ^B	0.018 ^B
65. Bis(2-Chloroethoxy)Methane	111911				
66. Bis(2-Chloroethyl)Ether	111444			0.030 ^B	0.53 ^B
67. Bis(2-Chloroisopropyl)Ether	108601			1,400	65,000
68. Bis(2-Ethylhexyl)Phthalate x	117817			1.2 ^B	2.2 ^B
69. 4-Bromophenyl Phenyl Ether	101553				
70. Butylbenzyl Phthalate w	85687			1,500	1,900

Priority Pollutants	CASRN	Freshwater-Aquatic Life:		Human Health for Consumption of:	
		ACUTE (CMC) (µg/L)	CHRONIC (CCC) (µg/L)	Water + Organism (µg/L)	Organism only (µg/L)
71. 2-Chloronaphthalene	91587			1,000	1,600
72. 4-Chlorophenyl Phenyl Ether	7005723				
73. Chrysene	218019			0.0038 ^B	0.018 ^B
74. Dibenzoa,hAnthracene	53703			0.0038 ^B	0.018 ^B
75. 1,2-Dichlorobenzene	95501			420	1,300
76. 1,3-Dichlorobenzene	541731			320	960
77. 1,4-Dichlorobenzene	106467			63	190
78. 3,3-Dichlorobenzidine	91941			0.021 ^B	0.028 ^B
79. Diethyl Phthalate w	84662			17,000	44,000
80. Dimethyl Phthalate w	131113			270,000	1,100,000
81. Di-n-Butyl Phthalate w	84742			2,000	4,500
82. 2,4-Dinitrotoluene	121142			0.11 ^B	3.4 ^B
83. 2,6-Dinitrotoluene	606202				
84. Di-n-Octyl Phthalate	117840				
85. 1,2-Diphenylhydrazine	122667			0.036 ^B	0.20 ^B
86. Flouranthene	206440			130	140
87. Flourene	86737			1,100	5,300
88. Hexachlorobenzene	118741			0.00028 ^B	0.00029 ^B
89. Hexachlorobutadiene	87683			0.44 ^B	18 ^B
90. Hexachlorocyclopentadiene	77474			40	1,100
91. Hexachloroethane	67721			1.4 ^B	3.3 ^B
92. Ideno 1,2,3-cdPyrene	193395			0.0038 ^B	0.018 ^B
93. Isophorone	78591			35 ^B	960 ^B
94. Naphthalene	91203				
95. Nitrobenzene	98953			17	690
96. N-Nitrosodimethylamine	62759			0.00069 ^B	3.0 ^B
97. N-Nitrosodi-n-Propylamine	621647			0.005 ^B	0.51 ^B
98. N-Nitrosodiphenylamine	86306			3.3 ^B	6.0 ^B
99. Phenanthrene	85018				
100. Pyrene	129000			830	4,000
101. 1,2,4-Trichlorobenzene	120821			35	70
102. Aldrin	309002	3.0 ^E		0.000049 ^B	0.000050 ^B
103. alpha-BHC	319846			0.0026 ^B	0.0049 ^B
104. beta-BHC	319857			0.0091 ^B	0.017 ^B
105. gamma-BHC (Lindane)	58899	0.95		0.98 ^B	1.8 ^B
106. delta-BHC	319868				
107. Chlordane	57749	2.4 ^E	0.0043 ^E	0.00080	0.00081

Priority Pollutants	CASRN	Freshwater-Aquatic Life:		Human Health for Consumption of:	
		ACUTE (CMC) (µg/L)	CHRONIC (CCC) (µg/L)	Water + Organism (µg/L)	Organism only (µg/L)
108. 4,4-DDT	50293	1.1 ^E	0.001 ^E	0.00022 ^B	0.00022 ^B
109. 4,4-DDE	72559			0.00022 ^B	0.00022 ^B
110. 4,4-DDD	72548			0.00031 ^B	0.00031 ^B
111. Dieldrin	60571	0.24	0.056 ^I	0.000052 ^B	0.000054 ^B
112. alpha-Endosulfan	959988	0.22 ^{E,M}	0.056 ^{E,M}	62	89
113. beta-Endosulfan	33213659	0.22 ^{E,M}	0.056 ^{E,M}	62	89
114. Endosulfan Sulfate	1031078			62	89
115. Endrin	72208	0.086	0.036 ^I	0.059	0.060
116. Endrin Aldehyde	7421934			0.29	0.30
117. Heptachlor	76448	0.52 ^E	0.0038 ^E	0.000079 ^B	0.000079 ^B
118. Heptachlor Epoxide	1024573	0.52 ^E	0.0038 ^E	0.000039 ^B	0.000039 ^B
119. Polychlorinated Biphenyls PCB's			0.014 ^H	0.000064 ^{B,J}	0.000064 ^{B,J}
120. Toxaphene	8001352	0.73	0.0002	0.00028 ^B	0.00028 ^B

Priority Footnotes:

A. Applies to total arsenic.

B. Based on carcinogenicity of 10⁻⁶ risk.

C. Freshwater Aquatic life Standards for these metals are expressed as a function of total hardness (mg/L, CaCO₃). The values displayed in the chart correspond to a total hardness of 100 mg/L. The hardness relationship is as follows:

	Acute = exp {ma [ln (hardness)] + ba}		Chronic = exp {mc [ln (hardness)] + bc}	
	ma	ba	mc	bc
Cadmium	1.0166	-3.924	0.7409	-4.719
Copper	0.9422	-1.700	0.8545	-1.702
Chromium III	0.8190	3.7256	0.8190	.6848
Lead	1.273	-1.460	1.273	-4.705
Nickel	0.8460	2.255	0.8460	.0584
Silver	1.72	-6.52	-----	-----
Zinc	0.8473	0.884	0.8473	0.884

Note: If the hardness is greater than or equal to 400 mg/L of CaCO₃, 400 mg/L will be used in the calculation.

D. Freshwater Aquatic Life values for pentachlorophenol are expressed as a function pH, and are calculated as follows: Acute CMC = $\exp [1.005 (\text{pH}) - 4.869]$; Chronic CCC= $\exp [1.005 (\text{pH}) - 5.134]$. Values displayed in table correspond to a pH of 7.8.

E. If assessment is to be done using an averaging period; the values should be divided by 2.

F. EPA has not calculated a human health criterion for this contaminant. However, permit authorities should address this contaminant in NPDES permit actions using the Tribe's existing narrative criteria for toxics. (see MCLs)

G. The $\text{CMC} = 1 / [(f1/\text{CMC}) + (f2/\text{CMC}2)]$ where f1 and f2 are the fractions of total selenium that are treated as selenite and selenate, respectively, and CMC1 and CMC2 are 186 $\mu\text{g/l}$ and 13 $\mu\text{g/l}$, respectively.

H. PCB's are a class of chemicals which include all aroclors.

I. The derivation of the chronic (CCC) standard for this pollutant did not consider exposure through the diet, which is probably important for aquatic life occupying upper trophic levels.

J. This standard applies to total PCBs.

K. This water quality standard is expressed as μg free cyanide (as CN)/L.

L. This water quality standard refers to the inorganic form only.

M. This standard was derived from data for endosulfan and is most appropriately applied to the sum of alpha-endosulfan and beta-endosulfan.

N. Under conditions of high dissolved organic carbon, copper is substantially less toxic and the Tribe will consider use of the Water Effect-Ratio.

O. EPA Region 8 recommends adopting this CCC value for Mercury while maintaining the existing Human Health values, as an interim step until EPA completes Guidance for implementation of the fish tissue value (0.3 mg/kg) for the protection of human health. This CCC value should be protective of Human Health for fish consumption.

P. The numeric water quality standards for metals are expressed as the total recoverable form of the metal.

Northern Cheyenne Tribe

Numeric Water Quality Standards Chart For Non-Priority Pollutants

(Footnotes A-B)

Non-Priority Pollutants	CASRN	Freshwater-Aquatic Life:		Human Health for Consumption of:	
		ACUTE (CMC) (µg/L)	CHRONIC (CCC) (µg/L)	Water + Organism (µg/L)	Organism only (µg/L)
1. Alkalinity			20,000		
2. Aluminum pH 6.5-9.0	7429905	750 ^A	87 ^{A,B}		
3. Ammonia	7664417	See Ammonia Table			
4. Aesthetic Qualities **		See Narrative standards			
5. Bacteria	See Physical and Biological Criteria Table				
6. Barium	7440393			1,000	
7. Boron**		See Narrative standards			
8. Chloride	16887006	860,000	230,000		
9. Chlorine	7782505	19	11		
10. Chlorophenoxy Herbicide 2,4,5-TP	93721			10	
11. Chlorophenoxy Herbicide 2,4-D	94757			100	
12. Chlorpyrifos	2921882	0.083	0.041		
13. Color **					
14. Demeton	8065483		0.1		
15. Ether, Bis Chloromethyl	542881			0.00010	0.00029
16. Gases, Total Dissolved **		See Narrative Standards			
17. Guthion	86500		0.01		
18. Hardness**		See Narrative standards			
19. Hexachlorocyclo-hexane-Technical	319868			0.0123	0.0414
20. Iron	7439896		1,000	300	
21. Malathion	121755		0.1		
22. Manganese	7439965			50	100
23. Methoxychlor	72435		0.03	100	
24. Mirex	2385855		0.001		
25. Nitrates	14797558			10,000	
26. Nitrosamines				0.0008	1.24
27. Dinitrophenols	25550587			69	5,300
28. Nitrosodibutylamine, N	924163			0.0063	0.22
29. Nitrosodiethylamine, N	55185			0.0008	1.24
30. Nitrosopyrrolidine, N	930552			0.016	34
31. Oil and Grease**		See Narrative Standards			
32. Oxygen, Dissolved	7782447	See Oxygen Table			
33. Parathion	56382	0.065	0.013		
34. Pentachlorobenzene	608935			1.4	1.5

Priority Pollutants	CASRN	Freshwater-Aquatic Life:		Human Health for Consumption of:	
		ACUTE (CMC) (µg/L)	CHRONIC (CCC) (µg/L)	Water + Organism (µg/L)	Organism only (µg/L)
35. pH		6.5-9.0	6.5-9.0	5.0-9.0	
36. Phosphorus Total**	7723140	See Narrative Standards			
37. Phosphate Phosphorous**		See Narrative Standards			
38. Solids Dissolved (TDS) and Salinity**		See Narrative Standards		250,000	
39. Solid Suspended (TSS) &/or Turbidity**		See Narrative Standards			
40. Sulfide-Hydrogen Sulfide	7783064		2.0		
41. Tainting Substances**					
42. Temperature	See Physical and Biological Criteria Table – Appendix D				
43. Tetrachlorobenzene, 1,2,4,5-	95943			0.97	1.1
44. Tributyltin TBT		0.46	0.072		
45. Trichlorophenol, 2,4,5-	95954			1,800	3,600
46. Clean Sediment**		See Narrative Standards			
47. Contaminated Sediment**		See Narrative Standards			

Non-Priority Pollutant Footnotes:

**See Narrative Standards.

A. This value is expressed in terms of total recoverable metal in the water column.

B. The use of Water-Effect Ratios might be appropriate at pH values greater than 7.0 and moderate to high hardness. Supporting data indicated that aluminum is substantially less toxic at higher pH and hardness, but the effects of pH and hardness are not well quantified at this time.

Freshwater Aquatic Life Standards for *dissolved oxygen* are as follows:

Standards for Waters Designated Cold, Cool, and Warm

	Early Life Stages ^{1,2}	Other Life Stages	Early Life Stages ²	Other Life Stages
30 Day Mean	N/A ³	6.5	N/A	5.5
7 Day Mean	9.5 (6.5)	N/A	6.0	N/A
7 Day Mean Minimum	N/A	5.0	N/A	4.0
1 Day Minimum ⁴	8.0 (5.0)	4.0	5.0	3.0

1. These are water column concentrations to achieve the required inter-gravel dissolved oxygen concentrations shown in parentheses. For species that have early life stages exposed directly to the water column, the figures in parentheses apply.
2. Includes all embryonic and larval stages and all juvenile forms to 30-days following hatching.

3. N/A (Not Applicable)

4. All minima should be considered as instantaneous concentrations to be achieved at all times.

Freshwater Aquatic Life Standards for *total ammonia* (mg/l NH₃-N plus NH₄-N) are expressed as a function of pH and temperature. Because these formulas are non-linear in pH and temperature, the standard is the average of separate evaluations of the formulas reflective of the fluctuations of flow, pH, and temperature within the averaging period; it is not appropriate to apply the formula to average pH, temperature and flow.

1. Acute Criteria

(a). The one-hour average concentration of total ammonia nitrogen (in mg N/L) can not exceed, more than once every three years on the average, the CMC (acute criterion) calculated as follows.

Where salmonid fish are present:

$$\text{CMC} = \frac{0.275}{1 + 10^{7.204 - \text{pH}}} + \frac{39.0}{1 + 10^{\text{pH} - 7.204}}$$

Or where salmonid fish are not present:

$$\text{CMC} = \frac{0.411}{1 + 10^{7.204 - \text{pH}}} + \frac{58.4}{1 + 10^{\text{pH} - 7.204}}$$

2. Chronic Criteria

(a). The thirty-day average concentration of total ammonia nitrogen (in mg N/L) can not exceed, more than once every three years on the average, the CCC (chronic criterion) calculated as follows.

When fish early life stages¹ are present:

$$\text{CCC} = \left(\frac{0.0577}{1 + 10^{7.688 - \text{pH}}} + \frac{2.487}{1 + 10^{\text{pH} - 7.688}} \right) \times \text{MIN} (2.85, 1.45 \times 10^{0.028 \times (25 - T)})$$

When fish early life stages¹ are absent:

$$\text{CCC} = \left(\frac{0.0577}{1 + 10^{7.688 - \text{pH}}} + \frac{2.487}{1 + 10^{\text{pH} - 7.688}} \right) \times (1.45 \times 10^{0.028 \times (25 - \text{MAX}(T, 7))})$$

¹ Includes all embryonic and larval stages and all juvenile forms of fish to 30-days following hatching.

Note: In addition, the highest four-day average within the 30-day period should not exceed 2.5 times the CCC.

For temperature (T) and pH conditions not expressed in Tables 1 and 2 below, ammonia toxicity criteria can be calculated using the equations above.

Ammonia Toxicity Criteria for Aquatic Life

The ammonia toxicity criteria in the tables below are expressed in milligrams ammonia nitrogen per liter (mg N/L) and vary with temperature and pH. The criteria vary with presence/absence of salmonid fishes and fish life stages as well.

Table 1.

PH-Dependent Values of the CMC (Acute Criterion) Ammonia Standard.

CMC, Total Ammonia nitrogen (mg/l NH ₃ -N plus NH ₄ -N)		
pH	Salmonids Present	Salmonids Absent
6.5	32.6	48.8
6.6	31.3	46.8
6.7	29.8	44.6
6.8	28.1	42.0
6.9	26.2	39.1
7.0	24.1	36.1
7.1	22.0	32.8
7.2	19.7	29.5
7.3	17.5	26.2
7.4	15.4	23.0
7.5	13.3	19.9
7.6	11.4	17.0
7.7	9.65	14.4
7.8	8.11	12.1
7.9	6.77	10.1
8.0	5.62	8.40
8.1	4.64	6.95
8.2	3.83	5.72
8.3	3.15	4.71
8.4	2.59	3.88
8.5	2.14	3.20
8.6	1.77	2.65
8.7	1.47	2.20
8.8	1.23	1.84
8.9	1.04	1.56
9.0	0.885	1.32

Table 2.

**Temperature and pH-Dependent Values of the CCC (Chronic Criterion)
For Fish Early Life Stages Present**

CCC for Fish Early Life Stages Present, mg N/L										
pH	Temperature, C									
	0	14	16	18	20	22	24	26	28	30
6.5	6.67	6.67	6.06	5.33	4.68	4.12	3.62	3.18	2.80	2.46
6.6	6.57	6.57	5.97	5.25	4.61	4.05	3.56	3.13	2.75	2.42
6.7	6.44	6.44	5.86	5.15	4.52	3.98	3.50	3.07	2.70	2.37
6.8	6.29	6.29	5.72	5.03	4.42	3.89	3.42	3.00	2.64	2.32
6.9	6.12	6.12	5.56	4.89	4.30	3.78	3.32	2.92	2.57	2.25
7.0	5.91	5.91	5.37	4.72	4.15	3.65	3.21	2.82	2.48	2.18
7.1	5.67	5.67	5.15	4.53	3.98	3.50	3.08	2.70	2.38	2.09
7.2	5.39	5.39	4.90	4.31	3.78	3.33	2.92	2.57	2.26	1.99
7.3	5.08	5.08	4.61	4.06	3.57	3.13	2.76	2.42	2.13	1.87
7.4	4.73	4.73	4.30	3.78	3.32	2.92	2.57	2.26	1.98	1.74
7.5	4.36	4.36	3.97	3.49	3.06	2.69	2.37	2.08	1.83	1.61
7.6	3.98	3.98	3.61	3.18	2.79	2.45	2.16	1.90	1.67	1.47
7.7	3.58	3.58	3.25	2.86	2.51	2.21	1.94	1.71	1.50	1.32
7.8	3.18	3.18	2.89	2.54	2.23	1.96	1.73	1.52	1.33	1.17
7.9	2.80	2.80	2.54	2.24	1.96	1.73	1.52	1.33	1.17	1.03
8.0	2.43	2.43	2.21	1.94	1.71	1.50	1.32	1.16	1.02	0.897
8.1	2.10	2.10	1.91	1.68	1.47	1.29	1.14	1.00	0.879	0.773
8.2	1.79	1.79	1.63	1.43	1.26	1.11	0.973	0.855	0.752	0.661
8.3	1.52	1.52	1.39	1.22	1.07	0.941	0.827	0.727	0.639	0.562
8.4	1.29	1.29	1.17	1.03	0.906	0.796	0.700	0.615	0.541	0.475
8.5	1.09	1.09	0.990	0.870	0.765	0.672	0.591	0.520	0.457	0.401
8.6	0.920	0.920	0.836	0.735	0.646	0.568	0.499	0.439	0.386	0.339
8.7	0.778	0.778	0.707	0.622	0.547	0.480	0.422	0.371	0.326	0.287
8.8	0.661	0.661	0.601	0.528	0.464	0.408	0.359	0.315	0.277	0.244
8.9	0.565	0.565	0.513	0.451	0.397	0.349	0.306	0.269	0.237	0.208
9.0	0.486	0.486	0.442	0.389	0.342	0.300	0.264	0.232	0.204	0.179

**Temperature and pH-Dependent Values of the CCC (Chronic Criterion)
For Fish Early Life Stages Absent**

CCC for Fish Early Life Stages Absent, mg N/L										
pH	Temperature, C									
	0-7	8	9	10	11	12	13	14	15*	16*
6.5	10.8	10.1	9.51	8.92	8.36	7.84	7.35	6.89	6.46	6.06
6.6	10.7	9.99	9.37	8.79	8.24	7.72	7.24	6.79	6.36	5.97
6.7	10.5	9.81	9.20	8.62	8.08	7.58	7.11	6.66	6.25	5.86
6.8	10.2	9.58	8.98	8.42	7.90	7.40	6.94	6.51	6.10	5.72
6.9	9.93	9.31	8.73	8.19	7.68	7.20	6.75	6.33	5.93	5.56
7.0	9.60	9.00	8.43	7.91	7.41	6.95	6.52	6.11	5.73	5.37
7.1	9.20	8.63	8.09	7.58	7.11	6.67	6.25	5.86	5.49	5.15
7.2	8.75	8.20	7.69	7.21	6.76	6.34	5.94	5.57	5.22	4.90

7.3	8.24	7.73	7.25	6.79	6.37	5.97	5.60	5.25	4.92	4.61
7.4	7.69	7.21	6.76	6.33	5.94	5.57	5.22	4.89	4.59	4.30
7.5	7.09	6.64	6.23	5.84	5.48	5.13	4.81	4.51	4.23	3.97
7.6	6.46	6.05	5.67	5.32	4.99	4.68	4.38	4.11	3.85	3.61
7.7	5.81	5.45	5.11	4.79	4.49	4.21	3.95	3.70	3.47	3.25
7.8	5.17	4.84	4.54	4.26	3.99	3.74	3.51	3.29	3.09	2.89
7.9	4.54	4.26	3.99	3.74	3.51	3.29	3.09	2.89	2.71	2.54
8.0	3.95	3.70	3.47	3.26	3.05	2.86	2.68	2.52	2.36	2.21
8.1	3.41	3.19	2.99	2.81	2.63	2.47	2.31	2.17	2.03	1.91
8.2	2.91	2.73	2.56	2.40	2.25	2.11	1.98	1.85	1.74	1.63
8.3	2.47	2.32	2.18	2.04	1.91	1.79	1.68	1.58	1.48	1.39
8.4	2.09	1.96	1.84	1.73	1.62	1.52	1.42	1.33	1.25	1.17
8.5	1.77	1.66	1.55	1.46	1.37	1.28	1.20	1.13	1.06	0.990
8.6	1.49	1.40	1.31	1.23	1.15	1.08	1.01	0.951	0.892	0.836
8.7	1.26	1.18	1.11	1.04	0.976	0.915	0.858	0.805	0.754	0.707
8.8	1.07	1.01	0.944	0.885	0.829	0.778	0.729	0.684	0.641	0.601
8.9	0.917	0.860	0.806	0.756	0.709	0.664	0.623	0.584	0.548	0.513
9.0	0.790	0.740	0.694	0.651	0.610	0.572	0.536	0.503	0.471	0.442

* At 15 C and above, the criterion for fish ELS absent is the same as the criterion for fish ELS present

General Notes:

(1) Priority and Non-Priority Pollutants are based on EPA's categories and include parameters determined to be toxic (toxin), carcinogenic (carcinogen), or harmful. Harmful parameters include nutrients, biological agents, and those parameters that cause taste and/or odor effects or physical effects.

(2) Carcinogens: chemicals classified by EPA as carcinogens for an oral route of exposure; Standards are based upon the incremental risk of causing one additional instance of cancer in one million persons. Includes those parameters in classifications A (Human Carcinogen), B1 or B2 (Probable Human Carcinogens), and C (Possible Human Carcinogen). For priority and non priority pollutants, values for carcinogens are calculated at a 10^{-6} risk level.

(3) Chronic Standards, based on 30 day average concentration, shall not exceed these values. Chronic standards will be evaluated on the basis of all samples taken with in any consecutive 30-day period. It is recommended that a minimum of 3 representative samples be provided.

(4) Radionuclide photon-emitters consisting of either beta or gamma emitters and are classified as carcinogenic. Their associated Standard is based upon a 4 mrem ede/yr exposure. This exposure is based upon daily ingestion of 2 liters of water. The emitters covered under this Standard are:

- _Cesium, radioactive
- _Iodine, radioactive
- _Strontium -89 and -90, radioactive
- _Tritium
- _Gamma photon emitters

(5) For surface waters the applicable Water Quality Standard is the more restrictive of either the Aquatic Life Standard or the Human Health Standards.

(6) Levels of individual petrochemicals in the water column should not exceed 0.010 of the lowest continuous flow 96-hour LC_{50} to several important fresh water species, each having high susceptibility to oils and petrochemicals.

(7) The ingestion of aquatic organisms is based on the assumption of 6.5 grams of aquatic organisms per day. Where it is shown that consumption is more than 6.5 grams per day, these values must be proportionately lowered. For example, if average consumption equals 13 grams per day then the appropriate standard should be divided by 2.

NCT Numeric Surface Water Maximum Contaminant Level (MCL) Standards Adopted To Protect The Public Water Supply Designated Use

Adopted Public Water Supply Criterion. All concentrations expressed as $\mu\text{g/l}$, except where noted.

Chemical Name	CASRN	SDWA MCL (1)	Potential Health Effects from Ingestion of Water (2)
Priority Pollutants			
Chlorobenzene	108-90-7	100	Liver, Kidneys
1,2,4-Trichlorobenzene	120-82-1	70	Adrenal Glands
1,1,1-Trichloroethane	71-55-6	200	Liver, nervous system, circulatory system
1,2-Dichlorobenzene	95-50-1	600	Liver, kidneys, circulatory system
1,4-Dichlorobenzene	106-46-7	75	Anemia, liver, kidneys, spleen, blood
1,2-trans-Dichloroethylene	156-60-5	100	Liver
Ethylbenzene	100-41-4	700	Liver, kidneys
Hexachlorocyclopentadiene	77-47-4	50	Kidneys, stomach
Lead	7439-92-1	TT3	Physical/mental development (children), kidney, high blood pressure (adults)
Toluene	108-88-3	1000	Nervous system, kidneys, liver
Antimony	7440-36-0	6	Blood cholesterol, blood sugar
Beryllium	7440-41-7	4	Intestinal lesions
Cadmium	7440-43-9	5	Kidneys
Chromium (total)	7440-47-3	100	Health effects not identified
Cyanide	57-12-5	200	Thyroid
Selenium	7782-49-2	50	Hair, fingernail, numbness, circulatory system

Non-priority Pollutants

Alachlor	15972-60-8	2	Eye, liver, kidneys, spleen, anemia, cancer
Atrazine	1912-24-9	3	Cardiovascular system, reproductive system
Carbufuran	1563-66-2	40	Blood, nervous system, reproductive system
2,4-D	94-75-7	70	kidney, liver, adrenal glands
Dalapon	75-99-0	200	Kidneys
Di(2-ethylhexyl)adipate	103-23-1	400	reproductive system
Dibromochloropropane	96-12-8	.02	Reproductive system, cancer
Dichloroethylene (cis-1,2-)	156-59-2	70	Liver
Dinoseb	88-85-7	7	Reproductive system
Diquat	85-00-7	20	Cataracts
Endothall	145-73-3	100	Stomach, intestines

Ethylene dibromide (EDB)	106-93-4	0.05	Liver, stomach, reproductive system, kidneys, cancer
Glyphosphate	1071-83-6	700	Kidneys, reproductive system
Methoxychlor	72-43-5	40	Reproductive system
Oxamyl (Vydate)	23135-22-0	20	Nervous system
Picloram	1918-0201	500	liver
Simazine	122-34-9	4	Blood
Styrene	100-42-5	100	Liver, kidneys, circulatory system
Xylenes	1330-20-7	10,000	Nervous system
Fluoride	7782-41-4	4,000	Bone, teeth
Nitrite	14797-65-0	1,000	Methemoglobinemia
Radiological (in pCi/l, except where noted)			
Alpha emitters	Multiple	15	Cancer
Beta/photon emitters	12587-47-2	4 mrem/y	Cancer
Combined Radium 226 & 228	13982-63-6	5	Cancer
	15262-20-1		

Notes:

(1) This Column shows published human health criteria based on the Federal Drinking Water maximum contaminant levels (MCLs), which, in most cases assume consumption of 2 liters of water per day. MCLs are the highest level of a contaminant that is allowed in drinking water.

(2) The potential effects are based on consumption of water containing pollutant concentrations that exceed the MCL, in most cases, over many years. The listed effects are consistent with those that drinking water systems must disclose to the public, on an annual basis, where MCL's have been exceeded during the year covered by the report. See 63 Federal Register 44512-44536, 40 CFR Parts 141 and 142, National Primary Drinking Water Regulation: Consumer Confidence Reports, Final Rule, August 19, 1998.

(3) For lead, the MCL requires a Treatment Technology (TT); however, the action level is 15 µg/l.

(4) Potential health effects for nickel are taken from *Is Your Drinking Water Safe?*, EPA 810-F-94-002, May, 1994.

ACRONYMS:

CASRN	Chemical Abstracts Service Registry Number
NCT	Northern Cheyenne Tribe
SDWA	Safe Drinking Water Act

APPENDIX B

Designated Use Table

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

WATERSHED		Rosebud Creek	Rosebud Creek	Rosebud Creek	Rosebud Creek	Rosebud Creek	Rosebud Creek
SEGMENT		Upper Dry Creek	Lower Dry Creek	Spring Gulch	Sheep Gulch	Corral Creek	Mainstem South Reservation Boundary to Corral Creek
Stream Classification	USE						
Class 1 Cold Water	Salmonid Propagation/growth						X
Class 2 Cold Water	Salmonid growth					X	
Class 1 Cool Water	Cool water fish Propagation/growth						
Class 2 Cool Water	Cool water fish Marginal Propagation		X				
Class 1 Warm Water	Warm water fish Propagation/ growth						
Class 2 Warm Water	Warm water fish Marginal propagation/ growth						
Class 1 Aquatic Life other than Fish	Aquatic life propagation/growth						
Class 2 Aquatic Life other than Fish	Aquatic life limited propagation/growth	X		X	X		
Recreation	Full contact						
	Incidental contact	X	X	X	X	X	X
Drinking	Conventional Treatment	X	X	X	X	X	X
Wildlife	Wildlife	X	X	X	X	X	X
Agriculture	Agriculture	X	X	X	X	X	X
Industrial	Industrial	X	X	X	X	X	X
Cultural	Cultural	X	X	X	X	X	X
Wetland	Wetland	X		X	X	X	X
OTRW	OTRW						

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

WATERSHED		Rosebud Creek	Rosebud Creek	Rosebud Creek	Rosebud Creek	Rosebud Creek	Rosebud Creek
SEGMENT		Mainstem Confluence Corral Creek to North Reservation Boundary	Skunk Creek	Pine Creek	Upper Trail Creek Headwaters to 1 st Reservoir	Lower Trail Creek 1 st reservoir to confluence Rosebud Creek	Wolf Creek
Stream Classification	USE						
Class 1 Cold Water	Salmonid Propagation/growth						
Class 2 Cold Water	Salmonid growth						
Class 1 Cool Water	Cool water fish Propagation/growth	X					
Class 2 Cool Water	Cool water fish Marginal propagation						
Class 1 Warm Water	Warm water fish Propagation/growth						
Class 2 Warm Water	Warm water fish marginal Propagation/growth						
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth						
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth		X	X	X	X	X
Recreation	Full contact	X					
	Incidental contact		X	X	X	X	X
Drinking	Conventional Treatment	X	X	X	X	X	X
Wildlife	Wildlife	X	X	X	X	X	X
Agriculture	Agriculture	X	X	X	X	X	X
Industrial	Industrial	X	X	X	X	X	X
Cultural	Cultural	X	X	X	X	X	X
Wetland	Wetland	X		X	X	X	
OTRW	OTRW						

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RE SERVATION

WATERSHED		Rosebud Creek	Rosebud Creek	Rosebud Creek	Rosebud Creek	Rosebud Creek	Busby Creek
SEGMENT		East Thompson	Thompson Creek	Dog Creek	Davis Creek	EagleFeathers Creek	Dry Creek
Stream Classification	USE						
Class 1 Cold Water	Salmonid Propagation/growth						
Class 2 Cold Water	Salmonid growth						
Class 1 Cool Water	Cool water fish Propagation/growth				X		
Class 2 Cool Water	Cool water fish marginal propagation		X				
Class 1 Warm Water	Warm water fish Propagation/growth						
Class 2 Warm Water	Warm water fish marginal Propagation/growth						
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth	X		X		X	X
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth						
Recreation	Full contact						
	Incidental contact	X	X	X	X	X	X
Drinking	Conventional Treatment	X	X	X	X	X	X
Wildlife	Wildlife	X	X	X	X	X	X
Agriculture	Agriculture	X	X	X	X	X	X
Industrial	Industrial	X	X	X	X	X	X
Cultural	Cultural	X	X	X	X	X	X
Wetland	Wetland	X					X
OTRW	OTRW						

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

WATERSHED		Busby Creek	Busby Creek	Rosebud Creek	Rosebud Creek	Rosebud Creek	Rosebud Creek
SEGMENT		East Fork	South Fork	Busby Creek Mainstem	Ash Creek	Deafy Creek	Teeth Creek
Stream Classification	USE						
Class 1 Cold Water	Salmonid Propagation/growth						
Class 2 Cold Water	Salmonid growth						
Class 1 Cool Water	Cool water fish Propagation/growth						
Class 2 Cool Water	Cool water fish marginal propagation						
Class 1 Warm Water	Warm water fish Propagation/growth						
Class 2 Warm Water	Warm water fish marginal Propagation/growth			X	X	X	
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth	X	X				X
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth						
Recreation	Full contact				X		
	Incidental contact	X	X	X		X	X
Drinking	Conventional Treatment	X	X	X	X	X	X
Wildlife	Wildlife	X	X	X	X	X	X
Agriculture	Agriculture	X	X	X	X	X	X
Industrial	Industrial	X	X	X	X	X	X
Cultural	Cultural	X	X	X	X	X	X
Wetland	Wetland						
OTRW	OTRW						

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

WATERSHED		Rosebud Creek	Rosebud Creek	Rosebud Creek	Rosebud Creek	Rosebud Creek	Rosebud Creek
SEGMENT		Dry Fork	Parker Creek	Black Whiteman Creek	Porcupine Creek	East Fork Porcupine Creek	Little Hawk Creek
Stream Classification	USE						
Class 1 Cold Water	Salmonid Propagation/growth						
Class 2 Cold Water	Salmonid growth						
Class 1 Cool Water	Cool water fish Propagation/growth						
Class 2 Cool Water	Cool water fish marginal propagation						
Class 1 Warm Water	Warm water fish Propagation/growth						
Class 2 Warm Water	Warm water fish marginal Propagation/growth						
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth			X	X	X	X
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth	X	X				
Recreation	Full contact						
	Incidental contact	X	X	X	X	X	X
Drinking	Conventional Treatment	X	X	X	X	X	X
Wildlife	Wildlife	X	X	X	X	X	X
Agriculture	Agriculture	X	X	X	X	X	X
Industrial	Industrial	X	X	X	X	X	X
Cultural	Cultural	X	X	X	X	X	X
Wetland	Wetland		X				
OTRW	OTRW						

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

WATERSHED		Rosebud Creek	Rosebud Creek	Rosebud Creek	Rosebud Creek	Indian Coulee	Indian Coulee
SEGMENT		Butte Creek	North Fork Butte Creek	David Creek	Wood Gulch	Indian Coulee Mainstem	Waterhole Creek
Stream Classification	USE						
Class 1 Cold Water	Salmonid Propagation/growth						
Class 2 Cold Water	Salmonid growth						
Class 1 Cool Water	Cool water fish Propagation/growth						
Class 2 Cool Water	Cool water fish marginal propagation						
Class 1 Warm Water	Warm water fish Propagation/growth						
Class 2 Warm Water	Warm water fish marginal Propagation/growth					X	
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth	X	X	X	X		X
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth						
Recreation	Full contact						
	Incidental contact	X	X	X	X	X	X
Drinking	Conventional Treatment	X	X	X	X	X	X
Wildlife	Wildlife	X	X	X	X	X	X
Agriculture	Agriculture	X	X	X	X	X	X
Industrial	Industrial	X	X	X	X	X	X
Cultural	Cultural	X	X	X	X	X	X
Wetland	Wetland					X	
OTRW	OTRW						

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

WATERSHED		Indian Coulee	Indian Coulee	Indian Coulee	Rosebud Creek	Rosebud Creek	Rosebud Creek
SEGMENT		South Fork	Williams Prong	North Fork	Two Moons Creek	Killsnight Creek	Ridgewalker Creek
Stream Classification	USE						
Class 1 Cold Water	Salmonid Propagation/growth						
Class 2 Cold Water	Salmonid growth						
Class 1 Cool Water	Cool water fish Propagation/growth						
Class 2 Cool Water	Cool water fish marginal propagation						
Class 1 Warm Water	Warm water fish Propagation/growth						
Class 2 Warm Water	Warm water fish marginal Propagation/growth						
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth	X	X	X	X	X	X
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth						
Recreation	Full contact						
	Incidental contact	X	X	X	X	X	X
Drinking	Conventional Treatment	X	X	X	X	X	X
Wildlife	Wildlife	X	X	X	X	X	X
Agriculture	Agriculture	X	X	X	X	X	X
Industrial	Industrial	X	X	X	X	X	X
Cultural	Cultural	X	X	X	X	X	X
Wetland	Wetland					X	X
OTRW	OTRW						

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

WATERSHED		Rosebud Creek	Rosebud Creek	Rosebud Creek	Rosebud Creek	Rosebud Creek	Ryegrass Creek
SEGMENT		Little Chief Creek	Black Spring Coulee	Lynch Coulee	Caswell Coulee	Ryegrass Creek Mainstem	West Fork
Stream Classificatio n	USE						
Class 1 Cold Water	Salmonid Propagation/growth						
Class 2 Cold Water	Salmonid growth						
Class 1 Cool Water	Cool water fish Propagation/growth						
Class 2 Cool Water	Cool water fish marginal propagation						
Class 1 Warm Water	Warm water fish Propagation/growth						
Class 2 Warm Water	Warm water fish marginal Propagation/growth						
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth	X	X		X	X	X
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth			X			
Recreation	Full contact						
	Incidental contact	X	X	X	X	X	X
Drinking	Conventional Treatment	X	X	X	X	X	X
Wildlife	Wildlife	X	X	X	X	X	X
Agriculture	Agriculture	X	X	X	X	X	X
Industrial	Industrial	X	X	X	X	X	X
Cultural	Cultural	X	X	X	X	X	X
Wetland	Wetland		X	X			X
OTRW	OTRW						

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

WATERSHED		Ryegrass Creek	Rosebud Creek	Greenleaf Creek	Greenleaf Creek	Greenleaf Creek
SEGMENT		Kelly Creek	Greenleaf Creek Main stem to Reservation boundary	Miller Creek	Hollowbreast Creek	Ash Creek
Stream Classification	USE					
Class 1 Cold Water	Salmonid Propagation/growth					
Class 2 Cold Water	Salmonid growth					
Class 1 Cool Water	Cool water fish Propagation/growth		X			
Class 2 Cool Water	Cool water fish marginal propagation					
Class 1 Warm Water	Warm water fish Propagation/growth					
Class 2 Warm Water	Warm water fish marginal Propagation/growth					
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth	X		X	X	X
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth					
Recreation	Full contact		X			
	Incidental contact	X		X	X	X
Drinking	Conventional Treatment	X	X	X	X	X
Wildlife	Wildlife	X	X	X	X	X
Agriculture	Agriculture	X	X	X	X	X
Industrial	Industrial	X	X	X	X	X
Cultural	Cultural	X	X	X	X	X
Wetland	Wetland	X	X		X	X
OTRW	OTRW					

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

WATERSHED		Muddy Creek	Muddy Creek	Muddy Creek	Muddy Creek	Muddy Creek
SEGMENT		Main stem to confluence Rosebud Creek	Whitedirt Creek	Wilfred Creek	Spang Creek	Juddy Creek
Stream Classification	USE					
Class 1 Cold Water	Salmonid Propagation/growth					
Class 2 Cold Water	Salmonid growth					
Class 1 Cool Water	Cool water fish Propagation/growth					
Class 2 Cool Water	Cool water fish marginal propagation					
Class 1 Warm Water	Warm water fish Propagation/growth	X				
Class 2 Warm Water	Warm water fish marginal Propagation/growth					
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth		X	X	X	X
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth					
Recreation	Full contact					
	Incidental contact	X	X	X	X	X
Drinking	Conventional Treatment	X	X	X	X	X
Wildlife	Wildlife	X	X	X	X	X
Agriculture	Agriculture	X	X	X	X	X
Industrial	Industrial	X	X	X	X	X
Cultural	Cultural	X	X	X	X	X
Wetland	Wetland	X				
OTRW	OTRW					

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

WATERSHED		Muddy Creek	Muddy Creek	Muddy Creek	Muddy Creek
SEGMENT		Coal Creek	Black Canyon Creek	Powell Creek	East Fork
Stream Classification	USE				
Class 1 Cold Water	Salmonid Propagation/growth				
Class 2 Cold Water	Salmonid growth				
Class 1 Cool Water	Cool water fish Propagation/growth				
Class 2 Cool Water	Cool water fish marginal propagation				
Class 1 Warm Water	Warm water fish Propagation/growth				
Class 2 Warm Water	Warm water fish marginal Propagation/growth				X
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth		X		
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth	X		X	
Recreation	Full contact				
	Incidental contact	X	X	X	X
Drinking	Conventional Treatment	X	X	X	X
Wildlife	Wildlife	X	X	X	X
Agriculture	Agriculture	X	X	X	X
Industrial	Industrial	X	X	X	X
Cultural	Cultural	X	X	X	X
Wetland	Wetland			X	
OTRW	OTRW				

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

WATERSHED		Muddy Creek	Muddy Creek	Muddy Creek	Muddy Creek
SEGMENT		Upper Spang Creek	Red Shale Creek	Longjaw Coulee	Paddy Creek
Stream Classification	USE				
Class 1 Cold Water	Salmonid Propagation/growth				
Class 2 Cold Water	Salmonid growth				
Class 1 Cool Water	Cool water fish Propagation/growth				
Class 2 Cool Water	Cool water fish marginal propagation				X
Class 1 Warm Water	Warm water fish Propagation/growth				
Class 2 Warm Water	Warm water fish marginal Propagation/growth				
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth	X	X	X	
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth				
Recreation	Full contact				
	Incidental contact	X	X	X	X
Drinking	Conventional Treatment	X	X	X	X
Wildlife	Wildlife	X	X	X	X
Agriculture	Agriculture	X	X	X	X
Industrial	Industrial	X	X	X	X
Cultural	Cultural	X	X	X	X
Wetland	Wetland				X
OTRW	OTRW				

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

WATERSHED		Muddy Creek	Muddy Creek	Muddy Creek	Muddy Creek
SEGMENT		Wild Hog Creek	West Fork	Cow Creek	Slocum Creek
Stream Classification	USE				
Class 1 Cold Water	Salmonid Propagation/growth				
Class 2 Cold Water	Salmonid growth				
Class 1 Cool Water	Cool water fish Propagation/growth				
Class 2 Cool Water	Cool water fish marginal propagation		X		
Class 1 Warm Water	Warm water fish Propagation/growth				
Class 2 Warm Water	Warm water fish marginal Propagation/growth				
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth	X		X	X
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth				
Recreation	Full contact				
	Incidental contact	X	X	X	X
Drinking	Conventional Treatment	X	X	X	X
Wildlife	Wildlife	X	X	X	X
Agriculture	Agriculture	X	X	X	X
Industrial	Industrial	X	X	X	X
Cultural	Cultural	X	X	X	X
Wetland	Wetland		X		
OTRW	OTRW				

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

WATERSHED		Muddy Creek	Muddy Creek	Muddy Creek	Muddy Creek
SEGMENT		Spring Creek	Medicine Elk Creek	Bee Creek	Shavedhead Creek
Stream Classification	USE				
Class 1 Cold Water	Salmonid Propagation/growth				
Class 2 Cold Water	Salmonid growth				
Class 1 Cool Water	Cool water fish Propagation/growth				
Class 2 Cool Water	Cool water fish marginal propagation				
Class 1 Warm Water	Warm water fish Propagation/growth				
Class 2 Warm Water	Warm water fish marginal Propagation/growth				
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth	X			
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth		X	X	X
Recreation	Full contact				
	Incidental contact	X	X	X	X
Drinking	Conventional Treatment	X	X	X	X
Wildlife	Wildlife	X	X	X	X
Agriculture	Agriculture	X	X	X	X
Industrial	Industrial	X	X	X	X
Cultural	Cultural	X	X	X	X
Wetland	Wetland				
OTRW	OTRW				

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

WATERSHED		Muddy Creek	Muddy Creek	Muddy Creek	Muddy Creek
SEGMENT		Horse Creek	Bear Creek	Brady Creek	Hardrobe Creek
Stream Classification	USE				
Class 1 Cold Water	Salmonid Propagation/growth				
Class 2 Cold Water	Salmonid growth				
Class 1 Cool Water	Cool water fish Propagation/growth				
Class 2 Cool Water	Cool water fish marginal propagation				
Class 1 Warm Water	Warm water fish Propagation/growth				
Class 2 Warm Water	Warm water fish marginal propagation/growth				X
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth	X	X	X	
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth				
Recreation	Full contact				
	Incidental contact	X	X	X	X
Drinking	Conventional Treatment	X	X	X	X
Wildlife	Wildlife	X	X	X	X
Agriculture	Agriculture	X	X	X	X
Industrial	Industrial	X	X	X	X
Cultural	Cultural	X	X	X	X
Wetland	Wetland		X		X
OTRW	OTRW				

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

WATERSHED		Rosebud Creek	Lame Deer Creek	Lame Deer Creek	Lame Deer Creek
SEGMENT		Lame Deer Creek Mainstem	Yellowfox Creek	Alderson Creek	Coal Creek/ Soldier Gulch
Stream Classification	USE				
Class 1 Cold Water	Salmonid Propagation/growth	X			
Class 2 Cold Water	Salmonid growth				
Class 1 Cool Water	Cool water fish Propagation/growth				
Class 2 Cool Water	Cool water fish marginal propagation				
Class 1 Warm Water	Warm water fish Propagation/growth				
Class 2 Warm Water	Warm water fish marginal Propagation/growth				
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth		X	X	X
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth				
Recreation	Full contact				
	Incidental contact	X	X	X	X
Drinking	Conventional Treatment	X	X	X	X
Wildlife	Wildlife	X	X	X	X
Agriculture	Agriculture	X	X	X	X
Industrial	Industrial	X	X	X	X
Cultural	Cultural	X	X	X	X
Wetland	Wetland	X		X	X
OTRW	OTRW				

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

WATERSHED		Lame Deer Creek	Lame Deer Creek	Lame Deer Creek	Lame Deer Creek
SEGMENT		Spottedelk Creek	Sweet Medicine	Calls First Gulch	South Fork
Stream Classification	USE				
Class 1 Cold Water	Salmonid Propagation/growth				
Class 2 Cold Water	Salmonid growth				
Class 1 Cool Water	Cool water fish Propagation/growth				
Class 2 Cool Water	Cool water fish marginal propagation				X
Class 1 Warm Water	Warm water fish Propagation/growth				
Class 2 Warm Water	Warm water fish marginal Propagation/growth				
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth	X			
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth		X	X	
Recreation	Full contact				
	Incidental contact	X	X	X	X
Drinking	Conventional Treatment	X	X	X	X
Wildlife	Wildlife	X	X	X	X
Agriculture	Agriculture	X	X	X	X
Industrial	Industrial	X	X	X	X
Cultural	Cultural	X	X	X	X
Wetland	Wetland	X	X		X
OTRW	OTRW				

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

WATERSHED		Lame Deer Creek	Lame Deer Creek	Lame Deer Creek	Lame Deer Creek	Lame Deer Creek
SEGMENT		White Buffalo Creek	East Fork	Broken Jaw Creek	Horn Creek	Standing Elk Creek
Stream Classification	USE					
Class 1 Cold Water	Salmonid Propagation/growth		X			
Class 2 Cold Water	Salmonid growth					
Class 1 Cool Water	Cool water fish Propagation/growth					
Class 2 Cool Water	Cool water fish marginal propagation					
Class 1 Warm Water	Warm water fish Propagation/growth					
Class 2 Warm Water	Warm water fish marginal Propagation/growth					
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth	X		X	X	X
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth					
Recreation	Full contact					
	Incidental contact	X	X	X	X	X
Drinking	Conventional Treatment	X	X	X	X	X
Wildlife	Wildlife	X	X	X	X	X
Agriculture	Agriculture	X	X	X	X	X
Industrial	Industrial	X	X	X	X	X
Cultural	Cultural	X	X	X	X	X
Wetland	Wetland		X	X		
OTRW	OTRW					

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

WATERSHED		Tongue River	Tongue River	Tongue River	Tongue River	Tongue River
SEGMENT		Confluence Mainstem Cook Creek to Birney Day Bridge	Main stem Tongue River Birney Day Bridge to Logging Crk	Confluence Mainstem Logging Crk to North Boundary	Prairie Dog Creek	Bull Creek Mainstem
Stream Classification	USE					
Class 1 Cold Water	Salmonid Propagation/growth					
Class 2 Cold Water	Salmonid growth					
Class 1 Cool Water	Cool water fish Propagation/growth	X	X			
Class 2 Cool Water	Cool water fish marginal propagation					
Class 1 Warm Water	Warm water fish Propagation/growth			X		
Class 2 Warm Water	Warm water fish marginal Propagation/growth					X
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth				X	
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth					
Recreation	Full contact	X	X	X		
	Incidental contact				X	X
Drinking	Conventional Treatment	X	X	X	X	X
Wildlife	Wildlife	X	X	X	X	X
Agriculture	Agriculture	X	X	X	X	X
Industrial	Industrial	X	X	X	X	X
Cultural	Cultural	X	X	X	X	X
Wetland	Wetland	X	X	X	X	X
OTRW	OTRW					

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

DRAINAGE		Bull Creek	Bull Creek	Bull Creek	Bull Creek	Tongue River
SEGMENT		Coyote Creek	South Fork	Middle Fork	North Fork	Cook Creek Main stem to confluence Tongue River
Stream Classification	USE					
Class 1 Cold Water	Salmonid Propagation/growth					
Class 2 Cold Water	Salmonid growth					
Class 1 Cool Water	Cool water fish Propagation/growth					
Class 2 Cool Water	Cool water fish marginal propagation					X
Class 1 Warm Water	Warm water fish Propagation/growth					
Class 2 Warm Water	Warm water fish marginal Propagation/growth					
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth	X	X	X	X	
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth					
Recreation	Full contact					
	Incidental contact	X	X	X	X	X
Drinking	Conventional Treatment	X	X	X	X	X
Wildlife	Wildlife	X	X	X	X	X
Agriculture	Agriculture	X	X	X	X	X
Industrial	Industrial	X	X	X	X	X
Cultural	Cultural	X	X	X	X	X
Wetland	Wetland	X	X	X		X
OTRW	OTRW					

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

WATERSHED		Cook Creek	Cook Creek	Tongue River	Tongue River
SEGMENT		Black Eagle Creek	St. John's Fork	Mission Creek	Birney Creek
Stream Classification	USE				
Class 1 Cold Water	Salmonid Propagation/growth				
Class 2 Cold Water	Salmonid growth				
Class 1 Cool Water	Cool water fish Propagation/growth				
Class 2 Cool Water	Cool water fish marginal propagation				
Class 1 Warm Water	Warm water fish Propagation/growth				
Class 2 Warm Water	Warm water fish marginal Propagation/growth				
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth	X	X		
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth			X	X
Recreation	Full contact				
	Incidental contact	X	X	X	X
Drinking	Conventional Treatment	X	X	X	X
Wildlife	Wildlife	X	X	X	X
Agriculture	Agriculture	X	X	X	X
Industrial	Industrial	X	X	X	X
Cultural	Cultural	X	X	X	X
Wetland	Wetland	X	X	X	X
OTRW	OTRW				

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

WATERSHED		Tongue River	Tie Creek	Tie Creek	Tongue River
SEGMENT		Tie Creek Mainstem to confluence Tongue River	Long Roach Creek	Clubfoot Creek	Pawnee Creek
Stream Classification	USE				
Class 1 Cold Water	Salmonid Propagation/growth				
Class 2 Cold Water	Salmonid growth				
Class 1 Cool Water	Cool water fish Propagation/growth				
Class 2 Cool Water	Cool water fish marginal propagation				
Class 1 Warm Water	Warm water fish Propagation/growth				
Class 2 Warm Water	Warm water fish marginal Propagation/growth	X			
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth		X	X	X
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth				
Recreation	Full contact				
	Incidental contact	X	X	X	X
Drinking	Conventional Treatment	X	X	X	X
Wildlife	Wildlife	X	X	X	X
Agriculture	Agriculture	X	X	X	X
Industrial	Industrial	X	X	X	X
Cultural	Cultural	X	X	X	X
Wetland	Wetland	X		X	X
OTRW	OTRW				

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

WATERSHED		Tongue River	Tongue River	Logging Creek	Logging Creek
SEGMENT			Logging Creek Mainstem to confluence Tongue River		
		Kelty Creek		Hollowood Creek	Parker Creek
Stream Classification	USE				
Class 1 Cold Water	Salmonid Propagation/growth				
Class 2 Cold Water	Salmonid growth				
Class 1 Cool Water	Cool water fish Propagation/growth				
Class 2 Cool Water	Cool water fish marginal propagation/growth				
Class 1 Warm Water	Warm water fish Propagation/growth				
Class 2 Warm Water	Warm water fish marginal Propagation/growth		X		
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth	X		X	X
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth				
Recreation	Full contact				
	Incidental contact	X	X	X	X
Drinking	Conventional Treatment	X	X	X	X
Wildlife	Wildlife	X	X	X	X
Agriculture	Agriculture	X	X	X	X
Industrial	Industrial	X	X	X	X
Cultural	Cultural	X	X	X	X
Wetland	Wetland		X	X	
OTRW	OTRW				

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

WATERSHED		Logging Creek	Logging Creek	Tongue River	Tongue River	Tongue River
SEGMENT		Woodenthigh Creek	Crazyhead Fork	Little Coyote Coulee	Walking Horse Coulee	Walking Horse Creek
Stream Classification	USE					
Class 1 Cold Water	Salmonid Propagation/growth					
Class 2 Cold Water	Salmonid growth					
Class 1 Cool Water	Cool water fish Propagation/growth		X			
Class 2 Cool Water	Cool water fish marginal propagation					
Class 1 Warm Water	Warm water fish Propagation/growth					
Class 2 Warm Water	Warm water fish marginal Propagation/growth					
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth	X				
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth			X	X	X
Recreation	Full contact		X			
	Incidental contact	X		X	X	X
Drinking	Conventional Treatment	X	X	X	X	X
Wildlife	Wildlife	X	X	X	X	X
Agriculture	Agriculture	X	X	X	X	X
Industrial	Industrial	X	X	X	X	X
Cultural	Cultural	X	X	X	X	X
Wetland	Wetland	X	X			
OTRW	OTRW					

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

WATERSHED		Tongue River	Stebbins Creek	Stebbins Creek	Stebbins Creek
SEGMENT		Stebbins Creek Mainstem	North Fork Stebbins Creek	South Fork Stebbins Creek	Lake Creek
Stream Classification	USE				
Class 1 Cold Water	Salmonid Propagation/growth				
Class 2 Cold Water	Salmonid growth				
Class 1 Cool Water	Cool water fish Propagation/growth				
Class 2 Cool Water	Cool water fish marginal propagation				
Class 1 Warm Water	Warm water fish Propagation/growth				
Class 2 Warm Water	Warm water fish marginal Propagation/growth				
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth	X	X		
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth			X	X
Recreation	Full contact				
	Incidental contact	X	X	X	X
Drinking	Conventional Treatment	X	X	X	X
Wildlife	Wildlife	X	X	X	X
Agriculture	Agriculture	X	X	X	X
Industrial	Industrial	X	X	X	X
Cultural	Cultural	X	X	X	X
Wetland	Wetland	X			
OTRW	OTRW				

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

WATERSHED		Stebbins Creek	Tongue River	Tongue River	Tongue River
SEGMENT		Cow Creek	Reservation Creek	Burning Creek	Lay Creek
Stream Classification	USE				
Class 1 Cold Water	Salmonid Propagation/growth				
Class 2 Cold Water	Salmonid growth				
Class 1 Cool Water	Cool water fish Propagation/growth				
Class 2 Cool Water	Cool water fish marginal propagation				
Class 1 Warm Water	Warm water fish Propagation/growth				
Class 2 Warm Water	Warm water fish marginal Propagation/growth				
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth	X	X		
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth			X	X
Recreation	Full contact				
	Incidental contact	X	X	X	X
Drinking	Conventional Treatment	X	X	X	X
Wildlife	Wildlife	X	X	X	X
Agriculture	Agriculture	X	X	X	X
Industrial	Industrial	X	X	X	X
Cultural	Cultural	X	X	X	X
Wetland	Wetland		X		
OTRW	OTRW				

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

MAJOR WATERSHED		Tongue River	Tongue River	Tongue River	Tongue River	Tongue River
Reservoirs, lakes, ponds, springs		Crazyhead Springs	Crazyhead Pond #1	Crazyhead Pond #2	Crazyhead Pond #3	Crazyhead Pond #4
Surface water Classification	USE					
Class 1 Cold Water	Salmonid Propagation/growth					
Class 2 Cold Water	Salmonid growth	X	X	X	X	X
Class 1 Cool Water	Cool water fish Propagation/growth					
Class 2 Cool Water	Cool water fish marginal propagation					
Class 1 Warm Water	Warm water fish Propagation/growth					
Class 2 Warm Water	Warm water fish marginal Propagation/growth					
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth					
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth					
Recreation	Full contact	X	X	X	X	X
	Incidental contact					
Drinking	Conventional Treatment	X	X	X	X	X
Wildlife	Wildlife	X	X	X	X	X
Agriculture	Agriculture	X	X	X	X	X
Industrial	Industrial	X	X	X	X	X
Cultural	Cultural	X	X	X	X	X
Wetland	Wetland	X	X	X	X	X
OTRW	OTRW					

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

MAJOR WATERSHED		Tongue River	Tongue River	Tongue River	Tongue River
Reservoirs, lakes, ponds, springs		Upper South Fork Logging Creek Spring #1	Upper South Fork Logging Creek Spring #2	White Horse Spring	Patrick Springs
Surface water Classification	USE				
Class 1 Cold Water	Salmonid Propagation/growth				
Class 2 Cold Water	Salmonid growth				
Class 1 Cool Water	Cool water fish Propagation/growth				
Class 2 Cool Water	Cool water fish marginal propagation				
Class 1 Warm Water	Warm water fish Propagation/growth				
Class 2 Warm Water	Warm water fish marginal Propagation/growth				X
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth	X	X	X	
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth				
Recreation	Full contact				
	Incidental contact	X	X	X	X
Drinking	Conventional Treatment	X	X	X	X
Wildlife	Wildlife	X	X	X	X
Agriculture	Agriculture	X	X	X	X
Industrial	Industrial	X	X	X	X
Cultural	Cultural	X	X	X	X
Wetland	Wetland	X	X	X	X
OTRW	OTRW				

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

MAJOR WATERSHED		Tongue River	Tongue River	Tongue River	Tongue River
Reservoirs, lakes, ponds, and springs		Woodenthigh Spring	South Fork Stebbins Creek Spring #1	North Fork Stebbins Creek Spring #1	Cow Creek Spring #1
Surface water Classification	USE				
Class 1 Cold Water	Salmonid Propagation/growth				
Class 2 Cold Water	Salmonid growth				
Class 1 Cool Water	Cool water fish Propagation/growth				
Class 2 Cool Water	Cool water fish marginal propagation				
Class 1 Warm Water	Warm water fish Propagation/growth				
Class 2 Warm Water	Warm water fish marginal Propagation/growth				
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth	X	X	X	X
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth				
Recreation	Full contact				
	Incidental contact	X	X	X	X
Drinking	Conventional Treatment	X	X	X	X
Wildlife	Wildlife	X	X	X	X
Agriculture	Agriculture	X	X	X	X
Industrial	Industrial	X	X	X	X
Cultural	Cultural	X	X	X	X
Wetland	Wetland	X	X	X	X
OTRW	OTRW				

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

MAJOR WATERSHED		Tongue River	Tongue River	Tongue River	Tongue River
Reservoirs, lakes, ponds, and springs		Upper Pawnee Creek Spring	Middle Pawnee Creek Spring	Lower Pawnee Creek Spring	Station Spring
Surface water Classification	USE				
Class 1 Cold Water	Salmonid Propagation/growth				
Class 2 Cold Water	Salmonid growth				
Class 1 Cool Water	Cool water fish Propagation/growth				
Class 2 Cool Water	Cool water fish marginal propagation				
Class 1 Warm Water	Warm water fish Propagation/growth				
Class 2 Warm Water	Warm water fish marginal Propagation/growth				
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth	X	X	X	X
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth				
Recreation	Full contact				
	Incidental contact	X	X	X	X
Drinking	Conventional Treatment	X	X	X	X
Wildlife	Wildlife	X	X	X	X
Agriculture	Agriculture	X	X	X	X
Industrial	Industrial	X	X	X	X
Cultural	Cultural	X	X	X	X
Wetland	Wetland	X	X	X	X
OTRW	OTRW				

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

MAJOR WATERSHED		Tongue River	Tongue River	Tongue River	Tongue River
Reservoirs, lakes, ponds, and springs		Hollowbreast Spring	Elliot Spring	Mission Creek Spring	Black Eagle Spring
Surface water Classification	USE				
Class 1 Cold Water	Salmonid Propagation/growth				
Class 2 Cold Water	Salmonid growth				
Class 1 Cool Water	Cool water fish Propagation/growth				
Class 2 Cool Water	Cool water fish marginal propagation				
Class 1 Warm Water	Warm water fish Propagation/growth				
Class 2 Warm Water	Warm water fish marginal Propagation/growth				
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth	X	X	X	X
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth				
Recreation	Full contact				
	Incidental contact	X	X	X	X
Drinking	Conventional Treatment	X	X	X	X
Wildlife	Wildlife	X	X	X	X
Agriculture	Agriculture	X	X	X	X
Industrial	Industrial	X	X	X	X
Cultural	Cultural	X	X	X	X
Wetland	Wetland	X	X	X	X
OTRW	OTRW				

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

MAJOR WATERSHED		Tongue River	Tongue River	Tongue River	Tongue River
Reservoirs, lakes, ponds, and springs		Canyon Spring	Rondeau Spring	B. Heart Spring	St. John's Spring
Surface water Classification	USE				
Class 1 Cold Water	Salmonid Propagation/growth				
Class 2 Cold Water	Salmonid growth				
Class 1 Cool Water	Cool water fish Propagation/growth				
Class 2 Cool Water	Cool water fish marginal propagation				
Class 1 Warm Water	Warm water fish Propagation/growth				
Class 2 Warm Water	Warm water fish marginal Propagation/growth				
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth	X	X	X	X
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth				
Recreation	Full contact				
	Incidental contact	X	X	X	X
	Conventional Treatment	X	X	X	X
Drinking					
Wildlife	Wildlife	X	X	X	X
Agriculture	Agriculture	X	X	X	X
Industrial	Industrial	X	X	X	X
Cultural	Cultural	X	X	X	X
Wetland	Wetland	X	X	X	X
OTRW	OTRW				

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

MAJOR WATERSHED		Tongue River	Tongue River	Tongue River	Tongue River
Reservoirs, lakes, ponds, and springs		Cook Creek Spring #1 S9	Cook Creek Spring #2 S13	Middle Fork Bull Creek Spring # 1 S17	Middle Fork Bull Creek Spring #2 S20
Surface water Classification	USE				
Class 1 Cold Water	Salmonid Propagation/growth				
Class 2 Cold Water	Salmonid growth				
Class 1 Cool Water	Cool water fish Propagation/growth				
Class 2 Cool Water	Cool water fish marginal propagation				
Class 1 Warm Water	Warm water fish Propagation/growth				
Class 2 Warm Water	Warm water fish marginal Propagation/growth				
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth	X	X	X	X
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth				
Recreation	Full contact				
	Incidental contact	X	X	X	X
Drinking	Conventional Treatment	X	X	X	X
Wildlife	Wildlife	X	X	X	X
Agriculture	Agriculture	X	X	X	X
Industrial	Industrial	X	X	X	X
Cultural	Cultural	X	X	X	X
Wetland	Wetland	X	X	X	X
OTRW	OTRW				

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

MAJOR WATERSHED		Tongue River	Tongue River	Tongue River	Tongue River
Reservoirs, lakes, ponds, and springs		South Fork Bull Creek Spring #1 Section 18	South Fork Bull Creek Spring #2 Section 28	Coyote Creek Spring #1 Section 33	Coyote Creek Spring #2 Section 35
Surface water Classification	USE				
Class 1 Cold Water	Salmonid Propagation/growth				
Class 2 Cold Water	Salmonid growth				
Class 1 Cool Water	Cool water fish Propagation/growth				
Class 2 Cool Water	Cool water fish marginal propagation				
Class 1 Warm Water	Warm water fish Propagation/growth				
Class 2 Warm Water	Warm water fish marginal Propagation/growth				
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth	X	X	X	X
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth				
Recreation	Full contact				
	Incidental contact	X	X	X	X
Drinking	Conventional Treatment	X	X	X	X
Wildlife	Wildlife	X	X	X	X
Agriculture	Agriculture	X	X	X	X
Industrial	Industrial	X	X	X	X
Cultural	Cultural	X	X	X	X
Wetland	Wetland	X	X	X	X
OTRW	OTRW				

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

MAJOR WATERSHED		Rosebud Creek	Rosebud Creek	Rosebud Creek	Rosebud Creek
Reservoirs, lakes, ponds, and springs		Pine Creek Spring	Parker Creek Spring	Killsnight Creek Spring	Indian Coulee Spring
Surface water Classification	USE				
Class 1 Cold Water	Salmonid Propagation/growth				
Class 2 Cold Water	Salmonid growth				
Class 1 Cool Water	Cool water fish Propagation/growth				
Class 2 Cool Water	Cool water fish marginal propagation				
Class 1 Warm Water	Warm water fish Propagation/growth				
Class 2 Warm Water	Warm water fish marginal Propagation/growth				
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth	X	X	X	X
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth				
Recreation	Full contact				
	Incidental contact	X	X	X	X
Drinking	Conventional Treatment	X	X	X	X
Wildlife	Wildlife	X	X	X	X
Agriculture	Agriculture	X	X	X	X
Industrial	Industrial	X	X	X	X
Cultural	Cultural	X	X	X	X
Wetland	Wetland	X	X	X	X
OTRW	OTRW				

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

MAJOR WATERSHED		Rosebud Creek	Rosebud Creek	Rosebud Creek	Rosebud Creek
Reservoirs, lakes, ponds, and springs		Black Springs	Ridge Walker Creek Spring	Lynch Coulee Spring	Powell Creek Spring
Surface water Classification	USE				
Class 1 Cold Water	Salmonid Propagation/growth				
Class 2 Cold Water	Salmonid growth				
Class 1 Cool Water	Cool water fish Propagation/growth				
Class 2 Cool Water	Cool water fish marginal propagation				
Class 1 Warm Water	Warm water fish Propagation/growth				
Class 2 Warm Water	Warm water fish marginal Propagation/growth				
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth	X	X	X	X
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth				
Recreation	Full contact				
	Incidental contact	X	X	X	X
Drinking	Conventional Treatment	X	X	X	X
Wildlife	Wildlife	X	X	X	X
Agriculture	Agriculture	X	X	X	X
Industrial	Industrial	X	X	X	X
Cultural	Cultural	X	X	X	X
Wetland	Wetland	X	X	X	X
OTRW	OTRW				

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

MAJOR WATERSHED		Rosebud Creek	Rosebud Creek	Rosebud Creek	Rosebud Creek
Reservoirs, lakes, ponds, and springs		Muddy Spring	Bear Creek Spring	Birdseye Spring	Dog Creek Spring
Surface water Classification	USE				
Class 1 Cold Water	Salmonid Propagation/growth				
Class 2 Cold Water	Salmonid growth				
Class 1 Cool Water	Cool water fish Propagation/growth				
Class 2 Cool Water	Cool water fish marginal propagation				
Class 1 Warm Water	Warm water fish Propagation/growth				
Class 2 Warm Water	Warm water fish marginal Propagation/growth				
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth	X	X	X	X
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth				
Recreation	Full contact				
	Incidental contact	X	X	X	X
Drinking	Conventional Treatment	X	X	X	X
Wildlife	Wildlife	X	X	X	X
Agriculture	Agriculture	X	X	X	X
Industrial	Industrial	X	X	X	X
Cultural	Cultural	X	X	X	X
Wetland	Wetland	X	X	X	X
OTRW	OTRW				

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

MAJOR WATERSHED		Rosebud Creek	Rosebud Creek	Rosebud Creek	Rosebud Creek
Reservoirs, lakes, ponds, and springs		Hard Robe Creek Spring #1, S24	Hard Robe Creek Spring #2, S20	Hard Robe Spring	Muddy Creek Spring #1, S7
Surface water Classification	USE				
Class 1 Cold Water	Salmonid Propagation/growth				
Class 2 Cold Water	Salmonid growth				
Class 1 Cool Water	Cool water fish Propagation/growth				
Class 2 Cool Water	Cool water fish marginal propagation				
Class 1 Warm Water	Warm water fish Propagation/growth				
Class 2 Warm Water	Warm water fish marginal Propagation/growth				
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth	X	X	X	X
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth				
Recreation	Full contact				
	Incidental contact	X	X	X	X
Drinking	Conventional Treatment	X	X	X	X
Wildlife	Wildlife	X	X	X	X
Agriculture	Agriculture	X	X	X	X
Industrial	Industrial	X	X	X	X
Cultural	Cultural	X	X	X	X
Wetland	Wetland	X	X	X	X
OTRW	OTRW				

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

MAJOR WATERSHED		Rosebud Creek	Rosebud Creek	Rosebud Creek	Rosebud Creek
Reservoirs, lakes, ponds, and springs		Muddy Creek Spring #2, S6	Killsnight Spring	Muddy Creek Spring #3, S 31, Brown's Camp	Muddy Creek Spring #4, S31, below Brown's Camp
Surface water Classification	USE				
Class 1 Cold Water	Salmonid Propagation/growth				
Class 2 Cold Water	Salmonid growth				
Class 1 Cool Water	Cool water fish Propagation/growth				
Class 2 Cool Water	Cool water fish marginal propagation				
Class 1 Warm Water	Warm water fish Propagation/growth				
Class 2 Warm Water	Warm water fish marginal Propagation/growth				
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth	X	X	X	X
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth				
Recreation	Full contact				
	Incidental contact	X	X	X	X
Drinking	Conventional Treatment	X	X	X	X
Wildlife	Wildlife	X	X	X	X
Agriculture	Agriculture	X	X	X	X
Industrial	Industrial	X	X	X	X
Cultural	Cultural	X	X	X	X
Wetland	Wetland	X	X	X	X
OTRW	OTRW				

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

MAJOR WATERSHED		Rosebud Creek	Rosebud Creek	Rosebud Creek	Rosebud Creek
Reservoirs, lakes, ponds, and springs		Muddy Creek Spring #5, S27, Big Bend	Paddy Creek Spring	Sweet Medicine Gulch Spring, S15	South Fork Lane Deer Creek, S11, Bixby Ranch
Surface water Classification	USE				
Class 1 Cold Water	Salmonid Propagation/growth				
Class 2 Cold Water	Salmonid growth				
Class 1 Cool Water	Cool water fish Propagation/growth				
Class 2 Cool Water	Cool water fish marginal propagation				
Class 1 Warm Water	Warm water fish Propagation/growth				
Class 2 Warm Water	Warm water fish marginal Propagation/growth				
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth	X	X	X	X
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth				
Recreation	Full contact				
	Incidental contact	X	X	X	X
Drinking	Conventional Treatment	X	X	X	X
Wildlife	Wildlife	X	X	X	X
Agriculture	Agriculture	X	X	X	X
Industrial	Industrial	X	X	X	X
Cultural	Cultural	X	X	X	X
Wetland	Wetland	X	X	X	X
OTRW	OTRW				

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

MAJOR WATERSHED		Rosebud Creek	Rosebud Creek	Rosebud Creek	Rosebud Creek
Reservoirs, lakes, ponds, and springs		South Fork Lame Deer Creek Spring, S15	Broken Jaw Spring	Alderson Creek Spring, S28	Barb wood Spring, S11
Surface water Classification	USE				
Class 1 Cold Water	Salmonid Propagation/growth				
Class 2 Cold Water	Salmonid growth				
Class 1 Cool Water	Cool water fish Propagation/growth				
Class 2 Cool Water	Cool water fish marginal propagation				
Class 1 Warm Water	Warm water fish Propagation/growth				
Class 2 Warm Water	Warm water fish marginal Propagation/growth				
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth	X	X	X	X
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth				
Recreation	Full contact				
	Incidental contact	X	X	X	X
Drinking	Conventional Treatment	X	X	X	X
Wildlife	Wildlife	X	X	X	X
Agriculture	Agriculture	X	X	X	X
Industrial	Industrial	X	X	X	X
Cultural	Cultural	X	X	X	X
Wetland	Wetland	X	X	X	X
OTRW	OTRW				

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

MAJOR WATERSHED		Rosebud Creek	Rosebud Creek	Rosebud Creek	Rosebud Creek
Reservoirs, lakes, ponds, and springs		Wood Spring S12	Diamond R Spring	Greenleaf Creek Spring. S13	Ash Creek Spring #1, S19
Surface water Classification	USE				
Class 1 Cold Water	Salmonid Propagation/growth				
Class 2 Cold Water	Salmonid growth				
Class 1 Cool Water	Cool water fish Propagation/growth				
Class 2 Cool Water	Cool water fish marginal propagation				
Class 1 Warm Water	Warm water fish Propagation/growth				
Class 2 Warm Water	Warm water fish marginal Propagation/growth				
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth	X	X	X	X
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth				
Recreation	Full contact				
	Incidental contact	X	X	X	X
Drinking	Conventional Treatment	X	X	X	X
Wildlife	Wildlife	X	X	X	X
Agriculture	Agriculture	X	X	X	X
Industrial	Industrial	X	X	X	X
Cultural	Cultural	X	X	X	X
Wetland	Wetland	X	X	X	X
OTRW	OTRW				

Table 1
DESIGNATED USE TABLE-NORTHERN CHEYENNE RESERVATION

MAJOR WATERSHED		Rosebud Creek	Rosebud Creek		
Reservoirs, lakes, ponds, and springs		Ash Creek Spring #2, S18	Hollowbreast Creek Spring		
Surface water Classification	USE				
Class 1 Cold Water	Salmonid Propagation/growth				
Class 2 Cold Water	Salmonid growth				
Class 1 Cool Water	Cool water fish Propagation/growth				
Class 2 Cool Water	Cool water fish marginal propagation				
Class 1 Warm Water	Warm water fish Propagation/growth				
Class 2 Warm Water	Warm water fish marginal Propagation/growth				
Class 1 Aquatic Life other than Fish	Aquatic life Propagation/growth	X	X		
Class 2 Aquatic Life other than Fish	Aquatic life limited Propagation/growth				
Recreation	Full contact				
	Incidental contact	X	X		
Drinking	Conventional Treatment	X	X		
Wildlife	Wildlife	X	X		
Agriculture	Agriculture	X	X		
Industrial	Industrial	X	X		
Cultural	Cultural	X	X		
Wetland	Wetland	X	X		
OTRW	OTRW				

APPENDIX C

Physical and Biological Criteria Table

NORTHERN CHEYENNE INDIAN RESERVATION
PHYSICAL AND BIOLOGICAL CRITERIA TABLE

Parameter	Recreation		Aquatic Life								Domestic
	Full Contact	Incidental Contact	Class 1 Cold Water Salmonid Propagation	Class 2 Cold Water Salmonid Growth	Class 1 Cool Water Fish Propagation	Class 2 Cool Water Fish Marginal Propagation	Class 1 Warm Water Fish Propagation	Class 2 Warm Water Fish Marginal Propagation	Class 1 No fish	Class 2 No Fish	
PHYSICAL **											
pH ¹	6.5 – 9.0	6.5 – 9.0	6.5 – 9.0	6.5 – 9.0	6.5 – 9.0	6.5 – 9.0	6.5 – 9.0	6.5 – 9.0	6.5 – 9.0	6.5 – 9.0	6.5 – 9.0
Dissolved Oxygen ²	Refer to Northern Cheyenne Numeric Criteria Table in Appendix A.										
Temperature (Maximum Values)			20° C	20° C	25° C	30° C	35° C	35° C	20° C	35° C	
Solids	Refer to Part III Section 3.5 Narrative Water Quality Criteria										
BIOLOGICAL **											
Fecal Coliforms ³ (colonies per 100 ml)	200	200									200
E. Coli ⁴	Refer to reference 4										

** All numerical references are listed in the “References for Physical and Biological Criteria” in Appendix C, page 2.

References for: Physical and Biological Criteria Table

1. Induced variation of hydrogen ion concentration (pH) within the range of 6.5 to 9.0 must be less than 0.5 pH unit. Natural pH outside this range must be maintained without change. Natural pH above 7.0 must be maintained above 7.0.
2. For those streams designated as Class 1 and Class 2 Cold water, a 0.5° C maximum temperature increase is allowed where naturally occurring water temperatures are in the range of 0° C to 10° C; within the naturally occurring range of 10° C to 15° C no discharge is allowed which will cause the water temperature to exceed 20° C. A 2° C per hour maximum decrease below naturally occurring water temperatures is allowed when the water temperature is above 20° C and a 2° C maximum decrease below naturally occurring water temperature is allowed within the range of 20° C to 0° C. A 1° C per-hour maximum decrease below naturally occurring water temperature is allowed when the water temperature is above 15° C and a 1° C maximum decrease below naturally occurring water temperature is allowed within the range of 20° to 0° C.

For those stream designated as Class 1 and Class 2 cool water, a 1° C maximum temperature increase is allowed where naturally occurring water temperatures are in the range 0° C to 20° C; within the naturally occurring range of 20° C to 25° C no discharge is allowed which will cause the water temperature to exceed 30° C. A 2° C per hour maximum decrease below naturally occurring water temperatures is allowed when the water temperature is above 30° C and a 2° C maximum decrease below naturally occurring water temperature is allowed within the range of 30° C to 0° C. A 1.1° C per-hour maximum decrease below naturally occurring water temperature is allowed when the water temperature is above 20° C and 1.1° C maximum decrease below naturally occurring water temperature is allowed within the range of 30° to 0° C.

For those streams designated Class 1 and Class 2 warm water, a 1° C maximum temperature increase is allowed where naturally occurring water temperatures are in the range 0° C to 30° C; within the naturally occurring range of 30° C to 35° C no discharge is allowed which will cause the water temperature to exceed 35° C. A 2° C per hour maximum decrease below naturally occurring water temperatures is allowed when the water temperature is above 35° C and a 2° C maximum decrease below naturally occurring water temperature is allowed within the range of 35° C to 0° C. A 1.1° C per-hour maximum decrease below naturally occurring water temperature is allowed when the water temperature is above 35° C and 1.1° C maximum decrease below naturally occurring water temperature is allowed with the range of 35° C to 0° C.
3. During periods when the daily maximum water temperature is greater than 15.5° C, the geometric mean number of organisms in the fecal coliform group must not exceed 200 per 100 milliliters, nor are 10% of the total samples during any 30-day period to exceed 400 fecal coliforms per 100 milliliters.
4. Criteria for the Full and Incidental Contact Recreation Use:

Based on a statistically sufficient number of samples (not less than 5 samples equally spaced over a 30-day period), the geometric mean of the E Coli densities shall not exceed 126 per 100 ml. In addition, no single sample shall exceed 235 per 100 ml in water designated for Full Contact Recreation or 406 per 100 ml in water designated as Incidental Contact Recreation.

Where exceedences of the geometric mean or single sample E. Coli criteria occur the Environmental Protection Department will take appropriate action to stop the source of the contamination. Where necessary, a sanitary survey procedure will be used to determine the source of the contamination.

APPENDIX D

NUMERIC CRITERIA TO SUPPORT AGRICULTURAL
And
CULTURAL USES

NORTHERN CHEYENNE TRIBE
 NUMERIC CRITERIA TO SUPPORT AGRICULTURAL USES ⁽¹⁾
 (Except where indicated, all concentrations are µg/l)

Parameter	Agricultural Use	
	Livestock	Irrigation
Arsenic	-	100 ⁽²⁾
Beryllium	-	100 ⁽²⁾
Boron	-	750 ⁽²⁾
Cadmium	50 ⁽³⁾	-
Chromium	1000 ⁽³⁾	-
Copper	500 ⁽³⁾	-
Lead	100 ⁽³⁾	-
Nitrate (as N)	100000 ⁽³⁾	-
Nitrite (as N)	10000 ⁽³⁾	-
Selenium	50 ⁽³⁾	-
Zinc	25000 ⁽³⁾	-
Sodium Adsorption Ratio ⁽⁴⁾		See table below

- (1) Implementation of these criteria shall include case-by-case decisions regarding averaging period and allowable frequency of exceedances, and shall take in consideration the use to be protected and the available toxicological data for the substance, including whether the effects are acute or chronic.
- (2) Criteria based recommendations included in the *Quality Criteria for Water*, 1976, U.S. EPA; U.S. Government Printing Office: 1977 (0-222-904).
- (3) Criteria based on recommendations included in *Water Quality Criteria*, 1972, National Academy of Sciences, March, 1973, EPA-R3-73-033.
- (4) Criteria based on recommendations included in Recommended in-stream standards, thresholds and criteria for irrigation or water spreading to soils of alluvial channels, ephemeral streams, flood plains, and potentially irrigable parcels of land within the boundaries of the Northern Cheyenne Reservation, 2001, Bauder, James W., Professor, Soil and water Specialist, Department of Land Resources and Environmental Sciences, Montana State University, Bozeman MT (Reference Table on page D2).

D1

Numeric Standards for EC and SAR including TDS Indicator Values
Applicable to the Tongue River and Rosebud Creek mainstems and tributaries^{1/}

	Electrical Conductivity (EC) ¹ dS/m	Sodium Adsorption Ratio (SAR) ²	Total Dissolved Solids (TDS) ³ mg/l
Southern Boundary			
Irrigation Period Average ⁴	1.0	--	660
Year round Maximum ⁵	1.5	2.0	990
Northern Boundary			
Irrigation Period Average	1.0	--	660
Year round Maximum	1.5	2.0	990
Tributaries			
Irrigation period average	1.0	--	660
Year round Maximum	1.5	2.0	990

^{1/} In response and consideration of comments, concerns, objections received from the Tongue River Water Users Association, the Montana Department of Environmental Quality, the Montana Natural Gas Alliance, the Northern Plains Resource Council, the following modification have been incorporated into the proposed surface water quality standards for EC and SAR of the Northern Cheyenne Reservation.

¹ The EC values are numerical water quality standards. EC is an expression of salinity as electrical conductance in units of deciSiemens per meter at 25 degrees C (dS/m) or in units of millimhos per centimeter (mmho/cm).

² The SAR values are numerical water quality standards. Sodium adsorption ratio (SAR) is an expression of the concentration of sodium relative to the sum of concentrations of calcium and magnesium in water.

$$\text{SAR} = (\text{meg/l}) \frac{[\text{Na}^+]}{\sqrt{\frac{[\text{Ca}^{+2}] + [\text{Mg}^{+2}]}{2}}} \quad \text{or} \quad (\text{ppm}) = \frac{[\text{Na}^+]}{\sqrt{\frac{[\text{Ca}^{+2} \times 0.05 + \text{Mg}^{+2} \times 0.083]}{2}}}$$

³ The TDS values are indicator values and are not water quality standards. TDS is an expression of salinity as total dissolved solids in mg/L. The TDS values will be used to monitor conditions and trends in Tribal waters. If a TDS indicator value is exceeded, the Tribe will evaluate the cause and, where appropriate, make necessary adjustments to the EC water quality standard(s). Any change to the EC standard will be made through the Tribe's water quality standards-setting process.

⁴ . An "irrigation period average" is the 30-day average applicable during the period of active irrigation or water spreading, defined by the Tribe as April 1st to November 15th annually.

⁵ a "maximum" value is an instantaneous maximum, not to be exceeded value, applicable during the period of active irrigation or water spreading and non-irrigation periods, defined by the Tribe as January 1st through December 31st.

D2

APPENDIX E

ANTIDEGRADATION REVIEW SHEET

ANTIDEGRADATION REVIEW SHEET

1. Name of Reviewer: _____
Name of Receiving Water: _____
Watershed: _____
Segment Location(Land Description): _____
Stream Classification: _____
Other: _____

2. Brief Description of Proposed Activity:

ID Number if any: _____

3. Which tier(s) of Antidegradation apply?

_____ Tier 3 - go to question 4

_____ Tier 2 - go to question 7

_____ Tier 3 - go to question 13

Tier 3 Questions

4. Will the proposed activity result in a permanent new or expanded source of pollutants directly to an ONRW segment?

_____ yes - recommend denial of a proposed activity

_____ no

5. If the proposed activity will result in a permanent new or expanded source of pollutants to a segment upstream from an ONRW segment, will the proposed activity affect ONRW water quality (see Part IV 1.4.3 A. of the implementation procedure).

_____ yes - recommend denial of proposed activity

_____ no

Basis for conclusion

6. If the proposed activity will result in a non-permanent new or expanded source of pollutants to ONRW segment or a segment upstream from an ONRW segment, will the proposed activity result in "temporary and limited" effects on ONRW water quality (see Part IV 1.4.3 B. of the implementation procedure)?

_____ yes

_____ no - recommend denial of proposed activity

Basis for conclusion:

Tier 2 Questions

7. Does the segment qualify for tier 2 protection based on the applicable criteria (see Part IV 1.4.4 A. of the implementation procedure)?

_____ yes

_____ no

Basis for conclusion:

8. Will the proposed activity result in significant degradation (see Part IV 1.4.4 B. of the implementation procedure)?

_____ yes

_____ no - recommend approval of the activity

_____ significance test by-passed due to availability of a reasonable less degrading alternative

If significance test not by-passed, basis for conclusion:

9. Has the applicant completed an adequate evaluation of alternatives and demonstrated that there are not reasonable alternatives to allowing the degradation (see Part IV 1.4.4 C. of the implementation procedure)?

_____ yes

_____ no - recommend denial of the proposed activity

If no, basis for conclusion:

10. Has the applicant demonstrated that the proposed activity will provide important socio-economic development in the are in which the affected waters are located (see Part IV 1.4.4 D. of the implementation procedure)?

_____ yes

_____ no - recommend denial of the proposed activity

If no, basis for conclusion:

11. Will existing uses be fully protected consistent with the Tier 1 procedures outlined by questions 14-16 below (questions 14-16 must be completed)?

_____ yes

_____ no- recommend denial of proposed activity

12. Has compliance with required controls on point and non-point sources in the zone of influence been assured (see Part IV 1.4.4 F. of the implementation procedures)?

_____ yes

_____ no - recommend denial of the proposed activity

Basis for conclusion:

Tier 1 Questions

13. The basis for concluding that tier 2 requirements do not apply is as follows (see Part IV 1.4.5 A of the implementation procedure):

14. Are there uses that exist or have existed since November 28th, 1975 that have more stringent water quality protection requirements than the currently designated uses (see Part IV 1.4.5.C of the implementation procedures)?

_____ yes

_____ no

If yes, basis for conclusion:

15. If the answer to question 14 was yes, what water quality criteria requirements will ensure protection of such existing uses (see Part IV 1.4.5 D(1). of the implementation procedure)?

(Indicate parameters and applicable water quality criteria.)

16. Will existing uses be fully maintained and protected (see Part IV 1.4.5 D(2). of the implementation procedure)?

_____ yes

_____ no - recommend denial of the proposed activity

If no, basis for conclusion:

Preliminary Decision

17. Based on the above, can the proposed activity be authorized pursuant to the Tribes'

Antidegradation policy?

_____ yes

_____ no

Basis for conclusion:

Signature: _____

Date: _____

APPENDIX F

HABITAT ASSESSMENT AND PHYSICOCHEMICAL
CHARACTERIZATION FIELD DATA SHEETS

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET

Stream Name:		Location:	
Station #:	River Mile:	Stream Class:	
Lat.	Long.	River Basin:	
Storet #	Agency:		
Investigators:			
Form Completed By:		Date:	Reason for Survey
		Time: am pm	

Weather Conditions	New	Past 24 Hours	Has there been a heavy rain in the last 7 day? ☐ yes ☐ no
	☐ Storm (heavy rain)	☐	
	☐ rain (steady rain)	☐	Air Temperature _____ °C
	☐ showers (intermittent)	☐	Other _____
	☐ %cloud cover _____ %	☐	
	☐ clear/sunny	☐	

Site Location Map	Draw a map of the site and indicate the areas sampled (or attach a photograph)

Stream Characterization	Stream subsystem ☐ Perennial ☐ Intermittent ☐ Tidal	Stream Type ☐ Coldwater ☐ Warmwater
	Stream Origin ☐ Glacial ☐ Spring-fed ☐ Non-glacial ☐ Mixture of Origins ☐ Swamp and bog ☐ Other _____	Catchment Area _____ km ²

PHYSICAL CHARACTERIZATION / WATER QUALITY FIELD DATA SHEET

Watershed Features	Predominant Surrounding Landuse ☐ Forest ☐ Commercial ☐ Field/pasture ☐ Industrial ☐ Agriculture ☐ Other _____ ☐ Residential		Local Watershed NPS Pollution ☐ No evidence ☐ Some potential sources ☐ Obvious sources		
Riparian Vegetation (18 meter buffer)	Indicate the dominant type and record the dominant species present ☐ Trees ☐ Shrubs ☐ Grasses ☐ Herbaceous Dominant Species present _____				
Instream Features	Estimated reach length _____ m Estimated stream width _____ m Sampling Reach area _____ m Area in km2 (m2 x 100) _____ km2 Estimated stream depth _____ m Surface velocity _____ m/sec (at thalweg)		Canopy cover ☐ partly open ☐ partly shaded ☐ shaded High water mark _____ m Proportion of reach represented by stream morphology types ☐ riffle _____ % ☐ run _____ % ☐ pool _____ % Channelized ☐ yes ☐ no Dam present ☐ yes ☐ no		
Large woody debris	L W D _____ M2 Density of LWD _____ m2/km2 (LWD reach area)				
Aquatic Vegetation	Indicate the dominant type and record the dominant species present: ☐ Rooted emergent ☐ Rooted submergent ☐ Rooted floating ☐ Free floating ☐ Floating algae ☐ Attached algae Dominant species present _____ Portion of the reach with aquatic vegetation _____ %				
Water Quality	Temperature _____ °C Specific conductance _____ Dissolved oxygen _____ pH _____ Turbidity _____ WQ instrument used _____		Water odors ☐ Normal/none ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Fishy ☐ Other _____ Water surface oils ☐ Slick ☐ Sheen ☐ Globbs ☐ Flecks ☐ None ☐ Other _____ Turbidity (if not measured) ☐ Clear ☐ Slightly turbid ☐ Turbid ☐ Opaque ☐ Stained ☐ Other _____		
Sediment Substrate	Odors ☐ Normal ☐ Sewage ☐ Petroleum ☐ Chemical ☐ Anaerobic ☐ None ☐ Other _____ Oils ☐ Absent ☐ Slight ☐ Moderate ☐ Profuse ☐ Yes ☐ No		Deposits ☐ Sludge ☐ Sawdust ☐ Paper fiber ☐ Sand ☐ Relic shells ☐ Other _____ Looking at stones which are not deeply embedded are the undersides black in color? ☐ yes ☐ no		
INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)					
Substrate Type	Diameter	% composition in Sampling reach			
Bedrock					
Boulder	>256 mm (10")				
Cobble	64-256 mm (2.5"-10")				
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2 mm (gritty)				
Silt	0.004-0.06 mm				
Clay	<0.004 mm (slick)				
ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)					
Substrate type	Characteristic	% composition in Sampling Area			
Detritus	Sticks, wood, coarse plant materials (CPOM)				
Muck-mud	Black, very fine organic (FPOM)				
Marl	Grey, shell fragments				

HABITAT ASSESSMENT FIELD DATA SHEET- HIGH GRADIENT STREAMS

STREAM NAME		LOCATION	
STATION #	RIVERMILE	STREAM CLASS	
LAT	LONG	RIVER BASIN	
STORET #		AGENCY	
INVESTIGATORS			
FORM COMPLETED BY:	DATE	AM PM	REASON FOR SURVEY

Parameters to evaluated in sampling reach	Habitat Parameter	Condition Category																					
		Optimal					Suboptimal					Marginal					Poor						
	1. Epifaunal substrate/ available cover	Greater than 70% of substrate favorable for Epifaunal colonization and fish cover: mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to show full colonization potential (i.e. logs, snags that are not new fall and not transient.					40%-70% mix of stable habitat: well suited for full colonization potential; adequate habitat fro maintenance of populations; presence of additional substrate in the term of newfall but not yet prepared for colonization (may rate at high end of scale)					20%-40% mix of stable habitat: habitat availability less than desirable: substrate frequently disturbed or removed.					Less than 20% stable habitat: lack of habitat is obvious: substrate unstable or lacking.						
	SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
	2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment: Layering of cobble provided diversity of niche space.					Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediments.					Gravel, cobble, and boulder particles are 75% surrounded by sediment.					Gravel, cobble, and boulder particles are more than 75% surrounded fine sediment.						
		20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
	3. Velocity / Depth Regime	All four velocity depth regimes present: slow-deep, slow-shallow fast-deep, fast-shallow. (Slow is <0.3 mfs, deep is > 0.5 m.)					Only 3 of the 4 regimes present: (If fast-shallow is missing. Score lower than if missing other regimes.)					Only 2 of the habitat regimes present: (if fast-shallow or slow-shallow are missing, score low).					Dominated by velocity-depth regime (slow-deep).						
		20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
	4. Sediment Deposition	Little or no enlargement of islands or point bas and less than 5% of the bottom affect by sediment deposition					Some new increase in bar formation, mostly from gravel, and or fine sediment: 5 - 30% of the bottom affected, slight deposition in pools.					Moderate deposition of new gravel, sand or fine sediment on old and new bars: 30-50% of the bottom affected: sediment deposits at obstructions, constrictions, and bends: moderate deposition of pools prevalent.					Heavy deposits of fine material, increased bar development: more than 50% of the bottom changing frequently: pools almost absent due to substantial sediment deposition.						
		20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
	5. Channel flow status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.					Water fills >75% of the available channel: or <25% of channel substrate is exposed.					Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.					Very little water in channel and mostly present as standing pools.						
		20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	

HABITAT ASSESSMENT FIELD DATA SHEET -- HIGH GRADIENT STREAMS

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern	Some channelization present; usually in areas of bridge abutments; evidence of past channelization; i.e., dredging (greater than 20 years) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach Channelized or disrupted.	Banks shored with gabion or cement; over 80% of the stream reach Channelized and disrupted; instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 and 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems; <5% of bank affected	Moderately stable; infrequent small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has area of erosion; high erosion potential during floods.	Unstable; many eroded raw areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of stream bank surface and immediate riparian zone covered by native vegetation; including shrubs or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the stream bank surfaces covered by native vegetation; but one class of plant is not well represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the stream bank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has removed to 5 centimeter or less in average stubble height.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian vegetative Zone Width (score each bank riparian zone)	Width of riparian zone .18 meters; human activities (i.e. parking lots, roadbeds, clearcuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6012 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total score _____

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS

STREAM NAME _____		LOCATION _____	
STATION# _____ RIVERMILE _____		STREAM CLASS _____	
LAT _____ LONG _____		RIVER BASIN _____	
STORET # _____		AGENCY _____	
INVESTIGATORS _____			
FORM COMPLETED BY: _____		DATE _____ AM _____ PM _____	
REASON FOR SURVEY: _____			

Parameters to be evaluated for sampling reach	Habitat Parameter	Condition Category																				
		Optimal					Suboptimal					Marginal					Poor					
	1. Epifaunal substrate Available Cover	Greater than 50% of substrate favorable for Epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e. logs/snags that are not new fall and not transient).					30-50% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall; but not yet prepared for colonization (may rate at high end of scale).					10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.					Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.					
	SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.					Mixture of soft sand, mud, or clay; mud may be dominant, some root mats and submerged vegetation present.					All mud or clay or sand bottoms; little or not root mats; no submerged vegetation.					Hard pan clay or bedrock; no root mats or submerged vegetation.					
	SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	3. Pool Variability	Even mix of large shallow, large deep, small shallow, small deep pools present.					Majority of pools large deep; very few shallow.					Shallow pools much more prevalent than deep pools.					Majority of pools small shallow or pools absent.					
	SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.					Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected slight deposition of pools.					Moderate deposition of new gravel, sand or fine sediment; on old and new bars: 30-80% of bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.					Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.					
	SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.					Water fills >75% of the available channel; or <25% of channel substrate is exposed.					Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.					Very little water in channel and mostly present as standing pools.					
	SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

HABITAT ASSESSMENT FIELD DATA SHEET – LOW GRADIENT STREAMS

Habitat Parameter	Condition Category																				
	Optimal					Suboptimal					Marginal					Poor					
6. Channel Alteration	Channelization of dredging absent or minimal; stream with normal pattern.					Some Channelization present, usually in areas of bridge abutments; evidence of past Channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.					Channelization may be extensive; embankments or shoring structures present on both bank; and 40 to 80% of stream reach channelized and disrupted.					Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted; instream habitat greatly altered or removed entirely.					
SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line (Note – channel braiding is considered normal in coastal plains and other low – lying areas. This parameter is not easily rated in these areas.					The bends in the stream increase the stream length 1 to 2 times longer than if it was in straight line.					The bends in the stream increase the stream length 1 to 2 times longer than if it was in straight line.					Channel straight; waterway has been channelized for a long distance.					
SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.					Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.					Moderately unstable; 30-60% of bank in reach has areas erosion; high erosion potential during floods.					Unstable, many eroded areas; "raw" areas frequent along straight section and bends; obvious bank sloughing; 60-100% of bank has erosional scars.					
SCORE (LB)	Left Bank 10 9					8 7 6					5 4 3					2 1 0					
SCORE (RB)	Right Bank 10 9					8 7 6					5 4 3					2 1 0					
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.					70-90% of the streambank surfaces covered by native vegetation, but on class of plants is not well represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.					50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.					Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.					
SCORE (LB)	Left Bank 10 9					8 7 6					5 4 3					2 1 0					
SCORE (RB)	Right Bank 10 9					8 7 6					5 4 3					2 1 0					
10. Riparian Vegetative zone width (Score each riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts lawns, or crops have not impacted zone.					Width of riparian zone 12-18 meters; human activities have impacted zone on minimally.					Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.					Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.					
SCORE (LB)	Left Bank 10 9					8 7 6					5 4 3					2 1 0					
SCORE (RB)	Right Bank 10 9					8 7 6					5 4 3					2 1 0					

Total score _____

Tongue River Draft Environmental Impact Statement Wetland and Water Resources Comments

Prepared For:

Northern Cheyenne Tribe
Lame Deer, Montana

Prepared By:

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2015

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Introduction

The Northern Cheyenne Tribe hired Geum Environmental Consulting, Inc. (Geum) to review and critique portions of the Tongue River Railroad Draft Environmental Impact Statement (DEIS) prepared by the Office of Environmental Analysis (OEA) related to potential impacts to water resources and concerns related to the wetland analysis in the DEIS (OEA 2015). The Northern Cheyenne Tribe specifically asked Geum to focus on impacts to plants in wetlands with cultural significance to the Tribe as these species were not addressed within the DEIS.

Professional Experience and Credentials

Karissa Ramstead has over five years of experience as a Wetland Ecologist working in Arizona, North Dakota, Idaho, and Montana. In 2011, while working for the Montana Natural Heritage Program, she conducted over 70 wetland assessments in southeastern Montana in the Upper Tongue River watershed, Lower Tongue River watershed, Upper Little Missouri watershed, Boxelder Creek watershed, and O’Fallon Creek watershed.

Tom Parker has more than 20 years of experience working in wetlands and riparian areas throughout Montana. He has taught wetlands-related workshops for Montana Department of Environmental Quality (DEQ) and managed projects related to wetland assessment and restoration in the Yellowstone River and Missouri River watersheds, in addition to many watersheds in western Montana. Tom is President and Principal Ecologist at Geum Environmental Consulting, Inc.

Work Summary

Geum evaluated the condition of wetlands and documented species of cultural significance along a section of the proposed Colstrip Alternative of the Tongue River Railroad. Representative wetlands were evaluated using the Ecological Integrity Assessment (EIA) methodology developed by the Montana Natural Heritage Program (MTNHP 2015a) and the Montana Department of Transportation’s Montana Wetland Assessment Method (MWAM) (MDOT 2008). The results of these two wetland assessment methods were compared to identify key characteristics that influence the wetland rankings of each method and highlight key wetland functions or attributes that each method captures. Geum compared the results of the EIA and MWAM assessments with wetland findings in the DEIS that used only the MWAM, and found that the MWAM assessments did not adequately capture the quality of wetlands that are found within the area along the proposed Colstrip Alternative. The EIA assessments and associated plant species documentation also recorded several plant species with cultural significance to the Northern Cheyenne Tribe within wetlands and surrounding riparian and/or upland areas. In further review of the DEIS, Geum identified concerns related to wetland mitigation as well as impacts to floodplains, surface hydrology, springs and seeps, and geomorphology. This memorandum is organized as follows:

- Critique of wetland assessment method used in the DEIS
- Risks associated with wetland mitigation
- Impacts on other water resources

Critique of Wetland Assessment Method used in the DEIS

Assessment Locations

Geum conducted wetland assessments within the area of the proposed Tongue River Railroad; Colstrip Alternative, and a small section of the Colstrip East Alternative, located in Rosebud County. Field assessments occurred the week of July 13th, 2015. Prior to the field visits, representatives from the Northern Cheyenne Tribe contacted landowners in these areas to gain permission to access properties and conduct wetland assessments. Six landowners granted permission to conduct assessments on their property. Ten sites were identified as potential locations for completing wetland assessments. Geum visited the ten sites and found that five of these sites met criteria for further assessment. Criteria to be considered for further assessment included being at least 0.1 acres in size and having wetland or other riparian ecological system characteristics. Three of the five sites meeting criteria for further assessment were evaluated for this scope of work.

Two of the assessed sites were located close to the proposed railroad route (McRae 01 and McRae 02). The third site (Wells) is outside of the proposed right-of-way, but was selected for assessment because it was representative of riparian conditions occurring in other portions of the right-of-way that were not available for assessment. Site descriptions for the three wetlands are provided in Attachment 1.

The DEIS wetland assessments were for representative composite wetland profiles rather than specific wetland locations; and therefore, the assessments conducted by Geum did not attempt to re-assess any specific locations that were assessed by OEA for the wetland analysis in the DEIS. Instead, Geum selected representative sites capturing some of the wetland diversity in the watershed.

Assessment Methods

At all ten visited sites, Geum recorded a list of dominant vegetation species observed regardless of the riparian or wetland status of each site. These species lists were compared to lists of culturally significant species provided by the Northern Cheyenne Tribe.

At the three wetland sites selected for further evaluation, Geum conducted wetland assessments using two methods, the EIA developed by the MTNHP and the MWAM developed for the MDOT. Both methods are briefly described below. These three wetlands were assigned to an 'Ecological System' as described by the MTNHP (MTNHP 2015b) as part of the EIA assessment. Naming of the wetland sites, or assessment areas (AA), in this document uses the Ecological System name followed by a unique site code.

Ecological Integrity Assessment

The MTNHP EIA emphasizes the structure and function of the ecological system independently of human values (MTNHP 2015a). The MTNHP EIA Level 2 assessment protocols use observable field indicators to evaluate general wetland condition in the context of ecological integrity, which is defined as "the structure, composition, and function of an ecosystem operating within the bounds of natural or historic range of variation" (WSDNR 2015). The MTNHP EIA

metrics are rated and scaled along a gradient that compares the observed wetland condition to a reference standard that represents the natural or undisturbed state. The numeric metric ratings are integrated to produce scores for four attributes: 1) Landscape Context, 2) Vegetation Structure, 3) Physicochemical, and 4) Hydrology (Table 1). The scores for the four attributes are combined to produce an overall EIA score which represents the status of evaluated wetlands along a gradient of least disturbed conditions to highly degraded conditions (Table 2).

Table 1. Ecological Integrity Assessment (EIA) attributes and metrics (From MTNHP 2015a).

Attribute	Metric
Landscape context	Landscape connectivity
	Buffer length
	Buffer width
	Buffer condition
Vegetation	Relative cover of native plant species
	Relative cover of aggressive graminoids
	Relative cover of noxious plant species
	Herbaceous litter/woody debris accumulation
	Interspersion of plant zones
	Woody species establishment and regeneration
	Utilization of trees and shrubs
Physicochemical	Soil surface integrity
	Water quality: algae, plants, and turbidity
Hydrology	Water inputs
	Water outlets
	Hydroperiod
	Surface water connectivity

Table 2. Ranges of EIA scores and their associated definitions (From Newlon et al. 2013).

EIA Score	Definition
90-100	At or near expected reference standard
80-89	Slight departure from reference standard
70-79	Moderate departure from reference standard
70 or less	Severe departure from reference standard

Montana Wetland Assessment Method

The Montana Department of Transportation's (MDOT) Montana Wetland Assessment Method (MWAM) was developed to support evaluating wetlands for highway and other linear projects (MDOT 2008). It evaluates both functions and values of wetlands and Table 3 below summarizes the variables that are evaluated by the assessment method. Some variables do not apply to all wetland types and may be rated as 'Not Applicable' or 'NA' and excluded from overall score calculations. Other variables are evaluated for all wetland sites and must be included in the overall score calculations. Table 4 provides criteria from MWAM for assigning wetland categories using the scores for the function and value variables.

Table 3. Function and value variables from Montana Wetland Assessment Method (MDOT 2008).

Function and Value Variables
Listed/proposed threatened and endangered species habitat ^(a)
Montana Natural Heritage Program species habitat ^(a)
General wildlife habitat ^(a)
General fish habitat
Flood attenuation
Short and long term surface water storage
Sediment/nutrient/toxicant removal
Sediment/shoreline stabilization
Production export/food chain support ^(a)
Groundwater discharge/recharge
Uniqueness ^(a)
Recreation/education potential (bonus points)

a. Required variables to calculate overall wetland site scores.

Table 4. Criteria for determine wetland categories from the MWAM (MDOT 2008).

Wetland Category	Criteria
Category I Wetland	Listed/proposed threatened and endangered species habitat = 1, or
	Uniqueness =1, or
	Flood attenuation = 1 and #14.E.ii ^(a) = yes, or
	Percent possible score >80%
Category II Wetlands	Montana Natural Heritage Program species habitat = 1, or
	General wildlife habitat = 0.9 or 1, or
	General fish habitat = 0.9 or 1, or
	General wildlife habitat and General fish habitat rated as either ‘high’ or ‘exceptional’, or
	Uniqueness = 0.9, or
	Percent possible score > 65%
Category III Wetlands	Criteria for Categories I, II, and IV not satisfied
Category IV Wetlands	Uniqueness rated as ‘low’, and
	Vegetated wetland component < 1 acre, and
	Percent possible score < 35%

- a. Ten or more acres of wetland in the AA are subject to flooding and man-made features which may be significantly damaged by floods are located within 0.5 miles downstream of the AA.

Ecological Integrity Assessment Findings

Resulting overall EIA scores for the three assessment areas (AAs) are shown in Table 5. Field data forms showing the details of the individual metric ratings from the EIA are included in Attachment 2. Formulas and scoring protocols used to calculate the EIA attribute scores from the metric ratings are included in Attachment 3.

The three AAs were classified as the Northwestern Great Plains Floodplain, Western Great Plains Open Freshwater Depression, and Northwestern Great Plains Riparian ecological systems (MTNHP 2015c, MTNHP 2015d, and MTNHP 2015e). All three of these ecological systems have a provisional state rank of S3 meaning they are potentially at risk, but may still be abundant in some areas (MTNHP 2015f). The AA classified as the Northwestern Great Plains Riparian ecological system includes riparian, non-wetland habitat, but since the vegetation composition is representative of other similar riparian areas along the proposed Colstrip Alternative the results from this assessment are included in this report.

The Northwestern Great Plains Floodplain (McRae_01) and the Western Great Plains Open Depression (McRae_02) AAs had overall EIA scores of 81 and 85 respectively, indicating slight departure from a reference standard wetland (Table 5). The Northwestern Great Plains Riparian (Wells) AA had an overall EIA score of 71 indicating a moderate departure from a reference standard wetland (Table 5).

Compared to previous EIA assessments in this region of Montana, these AAs fall in the middle to upper end of the range of wetland quality compared to reference standard conditions. Level 2 condition scores from field work completed by the MTNHP in 2011 found that for 67 wetlands assessed in this region of southeastern Montana, 7 (10.4%) scored at or near reference standard,

21 (31.3%) scored within the slight departure from reference standard, 26 (38.8%) fell within the moderate departure from reference standard, and 13 (19.4%) fell within severe departure from reference standard (Newlon et al. 2013).

Table 5. Wetland Conditional Scores using the MTNHP EIA.

Assessment Area	EIA Attribute Scores				Final AA EIA Score
	Landscape Connectivity Score	Vegetative Score	Physicochemical Score	Hydrological Score	
Northwestern Great Plains Floodplain (McRae_01)	90	77	75	83	81
Western Great Plains Open Depression (McRae_02)	73	83	88	96	85
Northwestern Great Plain Riparian (Wells)	43	65	75	100	71

Montana Wetland Assessment Method Findings

Table 6 below summarizes the findings of the MWAM assessments conducted for the three AAs. Data forms showing details of scoring for individual variables are included in Attachment 4. The Northwestern Great Plains Floodplain (McRae_01) was rated as a Category II Wetland, which MWAM describes as “...more common than Category I wetlands, and are those that provide habitat for sensitive plants or animals, function at very high levels for wildlife/fish habitat, are unique in a given region, or are assigned high ratings for many of the assessed functions and values” (MDOT 2008). The Western Great Plains Open Depression (McRae_02) and the Northwestern Great Plains Riparian (Wells) were rated as Category III wetlands, which MWAM describes as “...more common and generally less diverse than Category I and II wetlands. They can provide many functions and values, although they may not be assigned high ratings for as many parameters as are Category I and II wetlands” (MDOT 2008).

Table 6. Summary of wetland assessment findings conducted by Geum using MWAM (MDOT 2008).

MWAM Function and Value Variables	Northwestern Great Plains Floodplain (McRae_01)	Western Great Plains Open Depression (McRae_02)	Northwestern Great Plain Riparian (Wells)
Listed/proposed threatened and endangered species habitat ^(a)	0.1 (L)	0 (L)	0 (L)
Montana Natural Heritage Program species habitat ^(a)	0.7 (M)	0.5 (M)	0.5 (M)
General wildlife habitat ^(a)	0.9 (H)	0.5 (M)	0.1 (L)
General fish habitat	0.7 (M)	NA	NA
Flood attenuation	0.7 (M)	0.5 (M)	0.5 (M)
Short and long term surface water storage	0.8 (H)	0.9 (H)	0.7 (M)
Sediment/nutrient/toxicant removal	0.9 (H)	0.9 (H)	0.8 (H)
Sediment/shoreline stabilization	1 (H)	NA	NA
Production export/food chain support ^(a)	1 (H)	0.7 (M)	0.2 (L)
Groundwater discharge/recharge	NA	0.7 (M)	NA
Uniqueness ^(a)	0.3 (L)	0.3 (L)	0.2 (L)
Recreation/education potential (bonus points)	0.15 (H)	NA	NA
Percent of Possible Points	7.35 of 10 = 73.5%	5 of 9 = 55.6%	3 of 8 = 37.5%
Wetland Category Rating	Category II	Category III	Category III

a. Required variables to calculate overall wetland site scores.

Comparison of Findings and Scores

Table 7 below compares the MWAM ratings for the three wetlands Geum assessed to the MWAM ratings for similar wetland types reported in the Tongue River DEIS (Appendix M) (OEA 2015). Table 8 compares scores between MWAM and the EIA for the three wetland sites evaluated by Geum. Geum found the following five main critiques of the MWAM method which are discussed in the following sections:

- The representative composite wetland assessments for broad wetland types in the DEIS miss characteristics of some wetland types such as depressional wetlands.
- Different wetland assessment methods more accurately characterize some wetland functions as shown by the comparison of EIA hydrological scores and MWAM groundwater discharge and recharge.
- The MWAM and the EIA evaluate wetlands using different attributes and therefore can result in the same wetlands being ranked higher or lower by the different methods.
- Endangered Species Act (ESA) listed and candidate species along with Species of Concern (SOC) and their associated habitat have the potential to influence MWAM category rankings, but these species are less common in eastern Montana and more importantly, their primary habitat is not extensively documented in this portion of the state.

- Uniqueness related to wetland types also has the potential to influence MWAM category rankings, but unique wetland types referenced in the MWAM method are rare or do not occur in eastern Montana.
- Cultural plants species are not documented by the MWAM assessment.

Table 7. Comparison of MWAM wetland rankings from Geum’s assessment and the DEIS assessment of similar wetland types.

Assessment Area	Wetland Category Rating Geum	Similar Wetland from DEIS	Wetland Category Rating DEIS
Northwestern Great Plains Floodplain (McRae_01)	Category II	Tongue River and Adjacent Wetland	Category II
Western Great Plains Open Depression (McRae_02)	Category III	PEM-Depressional	Category III
Northwestern Great Plain Riparian (Wells)	Category III	PEM-Riverine/ Riverine - Vegetated	Category III

Table 8. Comparison of scores from the MWAM and MTNHP and descriptions of these category or condition that accompanies those scores.

	Northwestern Great Plains Floodplain (McRae_01)	Western Great Plains Open Depression (McRae_02)	Northwestern Great Plain Riparian (Wells)
MWAM Wetland Category	Category II	Category III	Category III
MWAM Category Description (MDOT 2008).	More common than Category I wetlands, may provide habitat for sensitive plants or animals, function at high levels fish/wildlife habitat, may be unique in a given region, or receive high ratings for many functions and values.	More common wetlands which are generally less diverse. Provide many functions and values, but not as many as Category I or Category II wetlands.	More common wetlands which are generally less diverse. Provide many functions and values, but not as many as Category I or Category II wetlands.
MTNHP EIA Score	81	85	71
MTNHP Score Description	Slight departure from reference standard	Slight departure from reference standard	Moderate departure from reference standard

Differences in Characterization of Wetland Functions

The overall MWAM wetland category ratings were the same as the ratings reported in the DEIS for the three wetland types included in this evaluation (Table 7). However, some scores vary for the individual function and value variables between the assessments conducted by Geum and the assessments reported in the DEIS findings. One notable difference, is the Western Great Plains Open Depression (McRae_02) AA for the groundwater discharge/recharge variable. Appendix M of the Tongue River DEIS noted that depressional wetlands “do not significantly contribute to

groundwater discharge or recharge” and the representative composite Depressional Wetlands assessment in the DEIS rated this variable as ‘NA’ (OEA 2015). While it is true that not all depressional wetlands in this area will provide groundwater recharge and discharge functions, the Western Great Plains Open Depression (McRae_02) AA is a spring fed wetland that contributes to groundwater discharge.

Many of the metrics and variables included in the MWAM and EIA methods evaluate similar characteristics of wetlands, but some show different results or levels of resolution for similar characteristics such as groundwater discharge/recharge mentioned above. The MWAM groundwater discharge/recharge variable is similar to the EIA documentation of wetland water sources and outlets that is part of the hydrological attribute. For the Northwestern Great Plains Floodplain (McRae_01) and Northwestern Great Plain Riparian (Wells) AAs, the MWAM results were ‘NA’ for groundwater discharge/recharge because either indicators of groundwater discharge/recharge are not present or insufficient information is available to determine the status of groundwater discharge/recharge. The EIA data for these AAs noted that the primary water source at the Northwestern Great Plains Floodplain (McRae_01) is alluvial storage/hyporheic flow and at the Northwestern Great Plain Riparian (Wells) AA it is precipitation; groundwater discharge is noted as another water source influencing the overall hydrology at both of these AAs. The EIA results also indicate that hydrologic function at Northwestern Great Plains Floodplain (McRae_01) is a slight departure from reference condition (EIA score of 83 for hydrological attribute), while hydrologic function at Northwestern Great Plain Riparian (Wells) is at or near reference condition (EIA score of 100 for hydrological attribute) (Table5). The MWAM incorporates other measures of water presence such as short- and long-term surface water storage, but this example demonstrates that an alternative wetland assessment method such as the EIA may provide more insight into different aspects of wetland function than the MWAM.

Differences in Rankings and Results for the Same Wetlands

The MWAM and the EIA evaluate wetlands using different attributes and therefore can result in the same wetlands being ranked higher or lower by the different methods. The MWAM focuses on wetland functions and values. The EIA emphasizes ecological integrity and evaluates the structure, composition and function of a wetland. For example, using the MWAM wetland category ratings, McRae_01 scored higher than McRae_02 mainly due to MWAM’s stronger emphasis on wildlife habitat and its inclusion of more value-related factors such as recreational use. Using the EIA scores, McRae_02 scored higher than McRae_01 because of the EIA methods’ greater emphasis on vegetation, physicochemical and hydrology attributes.

At McRae 01, the landowner noted that golden eagle (*Aquila chrysaetos*) has used the area for nesting in the past. Golden eagle is listed as a Species of Concern (SOCs), with a S3 status which resulted in McRae_01 being scored higher than McRae_02 for the MWAM variable relating to SOC habitat (MTNHP 2015g). There was also substantial evidence of other wildlife use at McRae 01 such as presence of many bird species, tracks and game trails, giving this site a higher score for the MWAM variable general wildlife habitat. The landowner also noted that McRae_01 is used for recreational activities such as fishing.

Using the EIA method, scores for vegetation, physicochemical, and hydrology attributes were higher for McRae_02 than they were for McRae_01. For the vegetation attribute, no browse on woody species was noted, and visual evidence indicated that water quality was higher at McRae_02. McRae_02 also has less hydrological alteration with only a small effects on hydrology due to a livestock water well. The Tongue River Dam, which is upstream of McRae_01, has led to hydrological alterations including the reduction of inundation duration and magnitude.

ESA Species and Species of Concern

Endangered Species Act (ESA) listed or candidate species that have the potential to occur in Rosebud County include: Sprague's pipit (*Anthus spragueii*), greater sage-grouse (*Centrocercus urophasianus*), yellow-billed cuckoo (*Coccyzus americanus*), whooping crane (*Grus americana*), and pallid sturgeon (*Scaphirhynchus albus*) (MTNHP 2015h, MTNHP 2015i, MTNHP 2015j, MTNHP 2015k, MTNHP 2015l). The Tongue River DEIS MWAM wetland analysis assumed that wetlands along the Tongue River corridor have the potential to provide secondary habitat for whooping crane. No other wetland types in the Tongue River DEIS analysis were assumed to provide habitat for the whooping crane (OEA 2015). Available maps from the MTNHP and the U.S. Fish and Wildlife Service show whooping cranes occurring within portions of Rosebud County but the area included within the Colstrip Alternative is just outside the mapped potential distribution for this species (MTNHP 2015k, USFWS 2015). The yellow-billed cuckoo has the potential to use riparian forests in eastern Montana, but there is only indirect evidence that this species has used areas within Rosebud County for breeding in the past (MTNHP 2015j). The pallid sturgeon is documented to occur within the Yellowstone River, but not within the Tongue River in Rosebud County (MTNHP 2015l). The two candidate species, Sprague's pipit and greater sage-grouse are upland bird species that may only incidentally use wetland or riparian habitats (MTNHP 2015h, MTHNP 2015i).

The MWAM ranks wetlands with documented primary habitat for ESA listed or candidate species as Category I wetlands regardless of ratings for other variables. As noted above, only whooping crane or yellow-billed cuckoo may potentially utilize wetland or riparian habitats in Rosebud County, but primary or secondary habitat for these species is more likely to occur along large streams and rivers. Most ESA listed or candidate species reported in Rosebud County do not use depressional wetlands, the second most common type of wetland in the DEIS study area, as their primary, secondary, or incidental habitat.

Within Rosebud County, Species of Concern (SOC) (state rank of S1, S2, or S3, MTNHP 2015g) include: great plains toad (*Anaxyrus cognatus*), spiny softshell turtle (*Apalone spinifera*), veery (*Catharus fuscescens*), snapping turtle (*Chelydra serpentina*), black-billed cuckoo (*Coccyzus erythrophthalmus*), blue sucker (*Cycleptus elongatus*), red-headed woodpecker (*Melanerpes erythrocephalus*), sauger (*Sander canadensis*), and plains spadefoot (*Spea bombifrons*), (MTNHP 2015l). Of these, only Great Plains toad and plains spadefoot are likely to be found in depressional wetlands. The remainder of these animal SOC, will mostly be restricted to wetlands and riparian areas that are associated with larger streams and rivers (e.g. Tongue River, Rosebud Creek, Otter Creek). Only two species of plants listed as SOC within Rosebud County

are likely to occur in wetlands; persistent-sepal yellow-cress (*Rorippa calycina*) and heavy sedge (*Carex gravida*) (MTNHP 2015m). Persistent-sepal yellow-cress has not been observed for over 30 years and potentially has only 4 known observations (MTNHP 2015n). Heavy sedge is documented as occurring in very few sites in eastern Montana (MTNHP 2015o).

Wetlands with documented primary habitat for SOC species are automatically ranked as Category II by MWAM, regardless of scores for other variables. Identifying wetlands or other ecosystems that are providing habitat is important for species protection, particularly in the context of infrastructure projects with regulatory oversight. However, the following factors contribute to wetlands being assessed by the MWAM method potentially being undervalued in eastern Montana: 1) relatively few ESA and SOC species occur in Rosebud County; and 2) documented primary habitat for these species is not widely available or documented within Rosebud County. Because of these reasons, MWAM scores eastern Montana wetlands low for species and habitats deemed important by federal and state agencies and programs; however, MWAM does not place equal weight on the presence of other, non-listed species and habitats that may be important to the Northern Cheyenne Tribe.

Uniqueness

Newlon and others (2013) note that aquatic resources, which includes wetlands, make up less than one percent of the total land area in southeastern Montana. This suggests that wetlands are a unique feature within the southeast Montana landscape; however, there are also some wetland types that are more unique than others.

Unique wetland types referenced in MWAM include “fens, bogs, warm springs, mature (older than 80 years) forested wetland, or wetland plant associations listed as S1 by the MTNHP” (MDOT 2008). To receive a high score for uniqueness using MWAM, one of these types must be present with low disturbance conditions in the wetland. The eastern Montana climate and landscape does not typically support fens, bogs, warm springs, or mature (older than 80 years) forested wetland (MTNHP 2015p, MTNHP 2015q, MTNHP 2015r, MTNHP 2015s, MTNHP 2015t, MTNHP 2015u). Wetland plant associations listed as S1 by the Montana Natural Heritage Program are also rare in eastern Montana (MTNHP 2015u).

The DEIS definition of unique wetlands includes “any wetland that is very low in abundance, completely undisturbed and intact, and extremely difficult to replace” (OEA 2015). This latter portion of the definition of being ‘undisturbed and intact’, broadens criteria for unique wetlands, but this is not an inclusive definition for unique wetlands in eastern Montana. Historic land use has relied heavily on agriculture and ranching, creating a landscape where few areas are in pristine condition, and most wetlands in eastern Montana have at least some level of disturbance. Using the DEIS definition of uniqueness, wetlands in eastern Montana will almost always be given a low score for this variable using the MWAM method based on disturbance conditions in the wetlands.

There are wetlands in this area of eastern Montana that could be considered unique outside of the context of the DEIS definition. For example, in 2011 Newlon and others (2013) found few wetlands with little or no hydrologic alteration; therefore, wetlands without hydrologic alteration

could be considered unique in the context of eastern Montana. Other wetland types that could be considered unique include spring- and seep-fed wetlands that tend to have fewer non-native plant species and generally higher species diversity compared to non-spring fed wetlands in this region (Karissa Ramstead, personal observation). Springs and seeps are also important to the maintenance of base flows of many streams and rivers and these inputs can be even more important in arid regions such as eastern Montana (MT DEQ 2015a). In addition, springs and seeps are culturally significant to many Native American tribes including the Northern Cheyenne Tribe. The Montana Department of Environmental Quality (2015b) indicates that naturally occurring saline wetlands that occur in eastern Montana are unique and have the potential to support rare species adapted to saline conditions.

Cultural Plant Species

One concern with the MWAM methodology is that it does not require the documentation of plant species which may include cultural plant species. Although the MTNHP EIA was not developed to document species of cultural significance, the Level 2 assessment does require that dominant plant species within different plant zones be recorded. Species that are recorded in the field can then be compared to cultural species lists. Geum did this for the 10 sites visited for this evaluation at the request of the Northern Cheyenne Tribe. Within the three wetland assessment areas cultural species that were observed included: boxelder, western yarrow (*Achillea millefolium*), common spikerush, green ash, field mint (*Mentha arvensis*), wild bergamont (*Mondarda fistulosa*), plains cottonwood, chokecherry, curly dock (*Rumex crispus*), and sandbar willow. In areas that were visited but not assessed, cultural species observed included: boxelder, big sagebrush (*Artemisia tridentata*), silver sage (*Artemisia cana*), showy milkweed (*Asclepias speciosa*), American licorice (*Glycyrrhiza lepidota*), junegrass (*Koeleria macrantha*), breadroot (*Pediomelum sp.*), chokecherry, and plains cottonwood.

Risk Associated with Wetland Mitigation

Risks to wetland integrity should be considered as part of a wetland mitigation effort as well as risks to surrounding areas outside of the extent of direct impacts within the proposed railroad right-of-way.

Soil disturbance associated with constructing the rail line and access roads will be ideal for non-native species invasion including noxious weeds. These invasions have the potential to extend beyond the right-of-way into wetland and riparian areas near the proposed rail line. Non-native and noxious weed species also pose a threat to cultural species that may be present in both wetlands and surrounding uplands. Therefore, a rigorous noxious and nuisance species management program should be in place prior to construction.

From Geum's experience designing wetland restoration projects since 2003, it is important to point out that a less direct, but more significant, risk stems from the idea that natural wetland systems develop over many years and not all years have conditions appropriate to support native species establishment. A linear transportation project is constructed over a relatively short period of time during which all the disturbance takes place. Natural wetlands can also develop as a result of disturbances such as floods or other geomorphic change, but these disturbances are

localized and do not all occur at the same time. These disturbances create diversity in wetland type, hydrology, plant species, and other wetland functions. A linear transportation project constructed during a compressed time period will result in more homogeneous wetlands than if these wetlands developed over the course of natural disturbance cycles. The risk in this is that a series of drought years might follow the project and potential wetland sites might be colonized by weedy species that tolerate a wide range of conditions. Rarer (and perhaps culturally important) species may be precluded under this scenario. Because of this, any wetland mitigation program should include provisions for actively managing plant species composition in wetlands beyond the five year period usually required by permitting agencies.

Impacts on Other Water Resources

Other water resources that could potentially be affected by the proposed project include floodplains, ephemeral drainages, springs and seeps. The DEIS states: “Therefore, OES’s assumption that the entire right-of-way would be disturbed likely overestimated the actual floodplain impacts” (OEA 2015). While it may be true that all floodplains within the right of way will not be disturbed, it is also true that disturbance to floodplains will not be limited to the right-of-way. Permanent structures such as earthen dikes, or other structures associated with rail lines, have the potential to disconnect floodplains from the river or stream. This can significantly alter the hydrology of the floodplain with the likely impact of drying sections of the floodplain and potentially impacting cottonwood forests and other riparian vegetation communities on those floodplains. This alteration can also affect downstream flooding by decreasing flood attenuation on the floodplains. Potential effects from increased flooding include increased bank migration rates on private land and damage to infrastructure.

The proposed rail line will bisect several intermittent and ephemeral streams. Currently no data are presented in the DEIS quantifying flow inputs from these drainages to Otter Creek, Rosebud Creek, and the Tongue River. For example, looking at aerial imagery the proposed Colstrip Alternative will bisect 10 ephemeral or intermittent drainages, that flow into Greenleaf Creek which is a tributary of Rosebud Creek. According to the DEIS none of these smaller intermittent and ephemeral streams have gauge data so it is unknown how much flow these tributaries contribute to Greenleaf Creek’s hydrology. The DEIS mentions the use of culverts or bridges for some drainages but does not specify which drainages will have culverts or bridges. Criteria for placing culverts and bridges should be described in more detail to more thoroughly understand the potential level of impact these structures may have on the hydrological inputs to larger streams and rivers in the potentially affected watersheds.

As noted earlier, springs have cultural significance to the Northern Cheyenne Tribe and some wetlands are supported by springs and seeps. Springs and seeps can also contribute to maintaining base flows in rivers and streams. Therefore, potential impacts to springs from construction-related activities such as excavation, fill placement and blasting are important to consider. Along the proposed Colstrip and Colstrip East Alternatives, two springs are documented by the USGS National Hydrography Dataset (USGS 2015) and of the Western Great Plains Open Depression (McRae_02) AA evaluated for this scope of work includes an unnamed

spring that not documented in the USGS National Hydrography Dataset. Currently, there is little reference to impacts to springs and seeps within the DEIS.

Historically Rosebud Creek has migrated across its floodplain, as evidenced by multiple oxbows and old channel scars that are visible on aerial imagery. Placing a new culvert or bridge over the channel would limit future migration of the channel. Potential consequences of limiting channel migration include, but are not limited to, stream incision or downcutting, increases in stream velocity from stream channelization (i.e., straightening of stream), and reduction in energy and processes such as overbank flooding that transfer nutrients to the floodplain and support regeneration of riparian vegetation. Channel migration is a necessary process that rejuvenates the riparian zone and its associated wetlands by creating areas of exposed sediment where seedlings of native trees and shrubs such as cottonwood, boxelder, green ash and chokecherry can establish.

Summary and Conclusions

- The representative composite wetland assessments for broad wetland types in the DEIS misses characteristics of some wetland types.
- Different wetland assessment methods such as the EIA are more appropriate in the context of eastern Montana as they will more accurately characterize some wetland functions than the MWAM.
- Endangered Species Act (ESA) listed and candidate species along with Species of Concern (SOC) are less common in this area of eastern Montana and their infrequency or absence has the potential to influence MWAM category rankings.
- The definition of uniqueness used by the DEIS has the potential to influence MWAM category rankings because wetland types referenced in the MWAM method are rare or do not occur in eastern Montana.
- Cultural plants species are not adequately documented by the MWAM assessment. Since MWAM does not document plant species outside of noting nuisance species, populations of culturally significant plant species which are less common such as spotted Joe-pye-weed (*Eupatoriadelphus maculatus*), sweetgrass (*Hierochloa odorata*), and Nevada bulrush (*Scirpus nevadensis*) may have been missed during wetland assessments conducted by OEA. Other wetland assessments, such as the EIA, do document plant species and therefore are more appropriate to capture species of cultural significance.
- Soil disturbance from construction of the rail line will result in areas that are highly susceptible to invasion from non-native plants and noxious weeds which can pose threats to native species and species of cultural significance.
- Wetlands develop over an extended period of time on a landscape from small localized disturbances. These disturbances (floods, fires, landslides or slumps, extreme climate years, etc.) create diversity in wetland type, hydrology, plant species, and other wetland functions. A linear transportation project constructed during a compressed time period will result in more homogeneous wetlands than if these wetlands developed over the course of natural disturbance cycles. Therefore, active wetland restoration followed by

extended monitoring will be necessary to achieve wetland restoration and mitigation objectives.

- Disturbance to floodplains will not be limited to the right-of-way, and changes to hydrology on these floodplains may result in negative impacts such as increased downstream flooding.
- Ephemeral and intermittent streams may potentially contribute large inputs to streams downstream, yet little is understood about the inputs and impacts to these ephemeral and intermittent stream along the proposed rail line.
- Impacts to springs were not adequately addressed in the DEIS.
- The construction of the rail line may impact channel migration zones altering important riparian ecological process.

Based on these conclusions, we recommend that the DEIS be modified to characterize wetlands using a method that better captures ecological integrity and function such as the Montana Natural Heritage Program's EIA. Potential impacts to cultural plant species in wetlands should be discussed, and the presence of these species could be better documented in wetlands using a method such as the EIA. The DEIS should describe risks from weed invasion and include mitigation measures to limit weeds. Wetland restoration and mitigation contemplated in the DEIS should be described in more detail, and should include a monitoring and adaptive management framework of sufficient detail and duration to make sure post-project wetlands are similar in composition and function to pre-project wetlands. Ephemeral/intermittent streams and springs should be documented and their flow contributions should be estimated. In general, a more comprehensive focus on water-related ecosystem processes would help clarify potential impacts to wetlands and any culturally important species that are associated with wetlands.

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Attachment 1. Site Descriptions and Ecological Integrity Assessment Data

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Northwestern Great Plains Floodplain (McCrae_01)

The assessment area (AA) is a wetland fringe that is approximately 2 acres in size within a larger riparian floodplain area of the Tongue River (Figure A-1). The AA is classified as riverine hydrogeomorphic class (Johnson 2005). Cowardin classes and water regimes present in the AA include: Palustrine Scrub-Shrub Seasonally Flooded (65%), Palustrine Scrub-Shrub Temporarily Flooded (25%), and Palustrine Emergent Seasonally Flooded (10%) (Cowardin et al. 1979). Two patch types (i.e., features within a wetland that increase the structural complexity and can perform important ecological functions) are present: open water-river (1-2%), and a backwater channel (10-25%).

According to the landowner the AA looks completely different today than it did prior to the 2012 Ash Creek Fire Complex that burned approximately 250,000 acres of ponderosa pine, sagebrush steppe, and grasslands in this area. Grazing appears to be limiting many shrubs, grasses, and sedges in the AA from growing much past 15cm-20cm in height. Despite the fire in 2012, there is a strip of buffaloberry (*Shepherdia argentea*) and chokecherry (*Prunus virginiana*) that have little to no fire scar tissue on trunks or branches. Plains cottonwood (*Populus deltoides*) recruitment is occurring on a low elevation surface immediately adjacent to the stream channel. The surrounding uplands are characterized as Great Plains Ponderosa Pine Woodland and Savanna (MTNHP 2015v). Observed signs of animal use while conducting the assessment included: antelope, beaver and cattle tracks; an unidentified skull; unidentified bivalve mollusks; and observations of two northern leopard frogs, several bird species, and macroinvertebrate species (Figure A-2).



Figure A- 1. Overview of McCrae_01 classified as the Northwestern Great Plains Floodplain Ecological System.



Figure A- 2. Signs of animal presence observed at McRae_01, including: unidentified skull (top left), unidentified bivalve mollusks (top right), northern leopard frog (bottom left), and beaver tracks (bottom right).

The AA contains hydrologic zones that support different plant communities. The majority of the AA is one to two feet above the river's current water elevation, and the remainder is approximately two to four feet above the current water elevation (25% of the AA). The lower elevation zone supports a scrub shrub vegetation community dominated by sandbar willow (*Salix exigua*) with a small fringe of graminoids along the river channel that includes: three-squared bulrush (*Schoenoplectus pungens*), prairie cordgrass (*Spartina pectinata*), common spikerush (*Eleocharis palustris*), reed canarygrass (*Phalaris arundinacea*), and creeping bentgrass (*Agrostis stolonifera*). Evidence of browse was noted on most plants in this zone.

The higher elevation zone is approximately 15 to 20 feet from the edge of channel and is dominated by buffaloberry, chokecherry, and green ash (*Fraxius pennsylvanica*). Table A-1 provides a summary of the dominant species and their average percent cover.



Figure A- 3. Overview of vegetation communities within McRae_01.

Table A- 1. Details of species observed at the McRae_01 AA.

Plant Zone	Stratum	Scientific Name	Common Name	Height (meters)	Average Cover (%)
Plant Zone 1	Herbaceous	<i>Agrostis stolonifera</i>	creeping bentgrass	<0.5m	7.5
		<i>Alisma triviale</i>	northern water-plantain	<0.5m	0.5
		<i>Carex sp.</i>	sedge	<0.5m	17.5
		<i>Cirsium arvense</i>	Canada thistle	<0.5m	0.5
		<i>Eleocharis palustris</i> *	common spikerush	<0.5m	3.5
		<i>Mentha arvensis</i> *	field mint	<0.5m	1.5
		<i>Phalaris arundinacea</i>	reed canarygrass	<0.5m	7.5
		<i>Populus deltoides</i> *	plains cottonwood	<0.5m	1.5
		<i>Rumex crispus</i> *	curly dock	<0.5m	1.5
		<i>Schoenoplectus pungens</i>	three-squared bulrush	<0.5m	7.5
		<i>Spartina pectinata</i>	prairie cordgrass	<0.5m	17.5
		<i>Symphytotrichum sp.</i>	aster sp.	<0.5m	1
	Shrub	<i>Rosa woodsii</i>	Wood's rose	<0.5m	3.5
		<i>Salix exigua</i> *	sandbar willow	0.5-1m	37.5
		<i>Symphoricarpos occidentalis</i>	western snowberry	<0.5m	1
Plant Zone 2	Herbaceous	<i>Arctium minus</i>	lessor burdock	<0.5m	1.5
		<i>Asparagus officinalis</i>	asparagus	<0.5m	1
		<i>Cirsium arvense</i>	Canada thistle	0.5-1m	7.5
		<i>Geum sp.</i>	avens	<0.5m	1
		<i>Monarda fistulosa</i> *	wild bergamont	0.5-1m	1.5
	Shrub	<i>Prunus virginiana</i> *	chokecherry	2-5m	17.5
		<i>Rosa woodsii</i>	Wood's rose	<0.5m	17.5
		<i>Shepherdia argentea</i>	silver buffaloberry	2-5m	62.5
		<i>Symphoricarpos occidentalis</i>	western snowberry	<0.5m	37.5
	Tree	<i>Fraxinus pennsylvanica</i> *	green ash	5-10m	17.5

*Denotes species of cultural significance to the Northern Cheyenne Tribe

Soil textures at McRae_01 range from sandy clay loam to loamy sand (Figure A-4, Table A-2, and Table A-3). An observed hydric soil indicator included redoximorphic features along pore linings within 5-10% the upper soil layers. Organic material in soils from both plant zones included charred vegetation from the 2012 fire that appeared to be mixed into soil profile from livestock use. Soils show signs of pugging related to livestock use.



Figure A- 4. Soil profile from Plant Zone 1 (left photo) and Plant Zone 2 (right photo) at McRae_01.

Table A- 2. Soil characteristics observed at Plant Zone 1 at McRae_01.

Soil Layer	Depth (cm)	Soil Texture	Soil Matrix Color	Redox Concentration Color	Redox concentration (%)	Redox concentration Type
1	0-35	sandy clay loam	2.5Y 3/2	7.5YR 4/6	10	Pore linings
2	35-60+	sandy clay loam	2.5Y 4/1	7.5YR 3/4	5	Pore linings

Table A- 3. Soil characteristics observed at Plant Zone 2 at McRae_01.

Soil Layer	Depth (cm)	Soil Texture	Soil Matrix Color	Redox Concentration Color	Redox concentration (%)	Redox concentration Type
1	0-16	sandy clay loam	10YR 3/2			
2	16-42+	sandy clay loam	2.5Y 4/3	7.5YR 5/6	5	Pore linings
3	45-52+	loamy sand	2.5Y 4/3	7.5YR 4/6	5	Pore linings

Western Great Plains Open Freshwater Depression (McRae_02)

The assessment area (AA) is 1.03 acres in size and is a portion of a larger, spring-fed depressional wetland (Figure A-5). The unnamed spring consists of a small distinct channel with a few pools within the larger wetland. The AA is classified as a slope hydrogeomorphic class (Johnson 2005). Cowardin classes and water regimes include: Palustrine Emergent Seasonally Flooded (65%), Palustrine Emergent Saturated (30%), and Palustrine Aquatic Bed Semi-permanently Flooded (5%) (Cowardin et al. 1979). Three patch types are present: open water-pools (1-2%), open water-small rivulet (5-10%), and adjacent or onsite springs/seeps (50-75%).

A livestock watering well at the downhill extent of the AA is fed by the spring through piping inserted into the slope. Water appears to continually overflow from the well into the wetland. This well only slightly impounds inputs to down-gradient portions of the wetland. An herbaceous upland zone surrounds the wetland and is dominated by Kentucky bluegrass (*Poa pratensis*) with several non-native forbs including: Canada thistle (*Cirsium arvense*), field bindweed (*Convolvulus arvensis*), and small tumble mustard (*Sisymbrium loeselii*). Adjacent forested uplands are classified as Great Plains Ponderosa Pine Woodland and Savanna (MTNHP 2015v). Much of this area burned during the 2012 Ash Creek Fire Complex killing most of the ponderosa pine (*Pinus ponderosa*) in the surrounding area, leaving only burnt snags (MTNHP 2015e). Wildlife observations during the assessment included: unidentified frogs, red-winged black birds (*Agelaius phoeniceus*), and northern flickers (*Colaptes auratus*). Vole burrows were also observed along the fringe of the wetland area. Evidence of large ungulates use (most likely cattle) was also observed and included trampled areas from animals bedding down and worn paths bordering both sides of the wetland.



Figure A- 5. Overview of McRae_02, classified as a Western Great Plains Freshwater Open Depression Ecological System.

Three wetland plant communities with distinct boundaries correspond to elevation changes within the depression in relation to the channel. Plant Zone 1 includes lower areas where the influence of channel overbank flow and seasonal flooding is most prevalent. Within Plant Zone 1, the pools and some of the channel is dominated by lesser duckweed (*Lemna minor*). The remainder of Plant Zone 1 is dominated by soft-stemmed bulrush (*Schoenoplectus tabernaemontani*). Plant Zone 2 is one to three feet higher in elevation on either side of the channel and is dominated by three-squared bulrush with patches of foxtail barley (*Hordeum jubatum*) on the outsides of this plant zone. Plant Zone 3 is near the spring source and dominant vegetation includes smooth scouring-rush (*Equisetum laevigatum*) and clustered field sedge (*Carex praegracilis*). Table A-4 provides a summary of the dominant species and their average percent cover.

Table A- 4. Details of species observed at the McRae_02 AA.

Plant Zone	Stratum	Scientific Name	Common Name	Height (meters)	Average Cover (%)
Plant Zone 1	Herbaceous	<i>Eleocharis palustris</i> *	common spikerush	<0.5	7.5
		<i>Epilobium sp.</i>	willow herb	<0.5	1
		<i>Juncus torreyi</i>	Torrey's rush	<0.5	7.5
		<i>Rumex stenophyllus</i>	narrowleaf dock	0.5-1m	1
		<i>Schoenoplectus pungens</i>	three-squared bulrush	0.5-1m	17.5
		<i>Schoenoplectus tabernaemontani</i>	soft-stemmed bulrush	0.5-1m	62.5
	Submerged-Floating	<i>Lemna minor</i>	lesser duckweed	<0.5	7.5
Plant Zone 2	Herbaceous	<i>Carex praegracilis</i>	clustered field sedge	<0.5	17.5
		<i>Hordeum jubatum</i>	foxtail barley	<0.5	7
		<i>Poa pratensis</i>	Kentucky bluegrass	<0.5	4
		<i>Schoenoplectus pungens</i>	Three-squared bulrush	0.5-1m	8
		<i>Symphotrichum falcatum</i>	white prairie aster	<0.5	4
		UNKNOWN GRAMINOID		<0.5	4
Plant Zone 3	Herbaceous	<i>Carex praegracilis</i>	clustered field sedge	<0.5	7
		<i>Equisetum laevigatum</i>	smooth scouring-rush	<0.5	8
		<i>Poa pratensis</i>	Kentucky blue-grass	<0.5	6

*Denotes species of cultural significance to the Northern Cheyenne Tribe

McRae_02 has clay soils. Hydric soil indicators include a depleted matrix with manganese redoximorphic concentrations that comprises 40% of the soil matrix in layer 2 (Table A-5). Soils were saturated to the surface during the assessment visit.

Table A- 5. Soil characteristics observed at Plant Zone 1 at McRae_02.

Soil Layer	Depth (cm)	Soil Texture	Soil Matrix Color	Redox Concentration Color	Redox concentration (%)	Redox concentration Type
1	0-12	clay	10YR 2/2	--	--	
2	12-69+	clay	2.5YR 4/1	N 2.5/1	40	soft masses

Northwestern Great Plains Riparian (Wells)

The assessment area (AA) is 1.97 acres in size and includes a portion of a larger riparian area along an abandoned reach of the Rosebud Creek channel (Figure A-6). The AA includes a short reach of Rosebud Creek where the former channel once connected, but a natural levee now separates the former channel from the current channel. The AA is classified as a depressional hydrogeomorphic class (Jones 2005). Because the AA is riparian rather than wetland Cowardin Classifications were not used, but instead classification developed for riparian mapping by the United States Fish and Wildlife Service was used (USFWS 2009). Vegetation classes for vegetated portions of the AA include: Riparian Forested (25%) and Riparian Emergent (75%) (USFWS 2009). Three patch types are present: open water-river/stream (2-5%), open water-oxbow/backwater channel (25-50%), bank slumps or undercut bank in channel or along shore (2-5%).

Much of the AA is riparian rather than wetland because it no longer has a hydrologic connection to Rosebud Creek along the portion of abandoned channel. However, the AA was still evaluated because it is representative of riparian vegetation communities found along Rosebud Creek. Within the AA, a one to two foot wetland fringe occurs along on the banks of Rosebud Creek and transitions to the natural levee that separates the current channel from the former channel. The abandoned channel portion of the AA is dominated by shrub vegetation. Agricultural fields, Rosebud Creek Road and a horse paddock occur immediately adjacent to the Rosebud Creek riparian area in the AA.



Figure A- 6. Overview of Wells, classified as a Northwestern Great Plains Riparian Ecological System.

Plant Zone 1 at Wells includes the natural levee between Rosebud Creek and the abandoned channel. This area is dominated by reed canarygrass, but there is a small wetland fringe along the creek where sedges (*Carex* sp.), soft-stem bulrush, and three-squared bulrush are found. Plant Zone 2 at Wells occurs along the abandoned channel. Reed canarygrass dominates the understory vegetation while boxelder (*Acer negundo*) and green ash dominate the shrub layer in

Plant Zone 2. Table A-6 provides a summary of the dominant species and their average percent cover.

Table A- 6. Details of species observed at the Wells AA.

Plant Zone	Stratum	Scientific Name	Common Name	Height (meters)	Average Cover (%)
Plant Zone 1	Herbaceous	<i>Carex sp.</i>	sedge	<0.5m	1
		<i>Cirsium arvense</i>	Canada thistle	<0.5m	17.5
		<i>Oenothera villosa</i>	hairy evening primrose	0.5-1m	1
		<i>Phalaris arundinacea</i>	reed canarygrass	<0.5m	85
		<i>Schoenoplectus tabernaemontani</i>	soft-stem bulrush	<0.5m	1
		<i>Schoenoplectus pungens</i>	three-squared bulrush	<0.5m	1
		<i>Sisymbrium loeselii</i>	small tumble mustard	0.5-1m	1.5
Plant Zone 2	Herbaceous	<i>Arctium minus</i>	lesser burdock	<0.5m	1.5
		<i>Bromus inermis</i>	smooth brome	0.5-1m	17.5
		<i>Cirsium arvense</i>	Canada thistle	<0.5m	17.5
		<i>Nepeta cataria</i>	catnip	<0.5m	1
		<i>Phalaris arundinacea</i>	reed canarygrass	<0.5m	37.5
	Shrub	<i>Ribes sp.</i>	currant	<0.5m	1.5
		<i>Symphoricarpos occidentalis</i>	western snowberry	<0.5m	3.5
	Forested	<i>Acer negundo*</i>	boxelder	5-10m	17.5
		<i>Fraxinus pennsylvanica*</i>	green ash	5-10m	62.5

*Denotes species of cultural significance to the Northern Cheyenne Tribe

The soil texture at Wells ranges from silty clay loams to clay loams. Pore linings with faint redoximorphic features are present in soil pit 2 located along the edge of the former channel feature, but these features are deep enough within the soil profile that this soil is not considered a hydric soil (Figure A-7, Table A-7, Table A-8).



Figure A- 7. Soil profile from Plant Zone 1 (left photo) and Plant Zone 2 (right photo) at Wells.

Table A- 7. Soil characteristics observed in Plant Zone 1 at Wells.

Soil Layer	Depth (cm)	Soil Texture	Soil Matrix Color	Redox Concentration Color	Redox concentration (%)	Redox concentration Type
1	0-61+	sandy clay loam	2.5Y 4/2	--	--	--

Table A- 8. Soil characteristics observed in Plant Zone 2 at Wells.

Soil Layer	Depth (cm)	Soil Texture	Soil Matrix Color	Redox Concentration Color	Redox concentration (%)	Redox concentration Type
1	0-25	silty clay loam	2.5YR 4.2	--	--	--
2	26-65	clay loam	2.5YR 4.2	7.5YR 4/6	5	pore linings
3	65-85+	clay loam	2.5YR 4.2	--	--	--

Species Data from Non-Assessed, Visited Sites

Table A- 9. Details of species observed at non-assessed sites.

Stratum	Scientific Name	Common Name	Wells-Upland	McRae-Riparian	McRae-Upland	Borntreger-Riparian	Snodgrass-Riparian	Snodgrass-Wetland
Graminoids	<i>Bromus inermis</i>	smooth brome				x	x	x
	<i>Bromus japonicus</i>	Japanese brome	x					
	<i>Koeleria macrantha</i> *	prairie junegrass	x					
	<i>Schoenoplectus pungens</i>	three-square bulrush						x
	<i>Spartina pectinata</i>	prairie cordgrass						x
Forbs	<i>Achillea millefolium</i> *	common yarrow	x					
	<i>Artemisia frigida</i>	fringed sage	x					
	<i>Asclepias speciosa</i> *	showy milkweed						x
	<i>Asparagus officinalis</i>	asparagus				x		
	<i>Cirsium arvense</i>	Canada thistle		x	x			
	<i>Convolvulus arvensis</i>	field bindweed			x			
	<i>Glycyrrhiza lepidota</i> *	American licorice					x	x
	<i>Linum lewisii</i>	prairie flax	x					
	<i>Pedimelum sp</i>	breadroot			x			
	<i>Plantago major</i>	common plantain			x			
	<i>Sisymbrium loeselii</i>	small tumble mustard			x		x	
Shrubs	<i>Yucca glauca</i>	small soapweed yucca	x					
	<i>Acer negundo</i>	boxelder					x	
	<i>Artemisia tridentata</i> *	big sagebrush	x					
	<i>Artemisia cana</i> *	silver sagebrush	x					
	<i>Gutierrezia sarothrae</i>	broom snakeweed	x					
	<i>Prunus virginiana</i> *	chokecherry		x		x	x	
	<i>Rhus trilobata</i>	skunkbush sumac	x					
	<i>Rosa woodsii</i>	Wood's Rose		x		x		
	<i>Salix exigua</i> *	sandbar willow				x		
	<i>Symphoricarpos occidentalis</i>	western snowberry		x			x	

Stratum	Scientific Name	Common Name	Wells-Upland	McRae-Riparian	McRae-Upland	Borntreger-Riparian	Snodgrass-Riparian	Snodgrass-Wetland
Trees	<i>Fraxinus pennsylvanica</i> *	green ash				x		
	<i>Populus deltoides</i> *	plains cottonwood		x				

*Denotes species of cultural significance to the Northern Cheyenne Tribe

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Attachment 2. Ecological Integrity Assessment Data Forms

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Site ID McRae 01

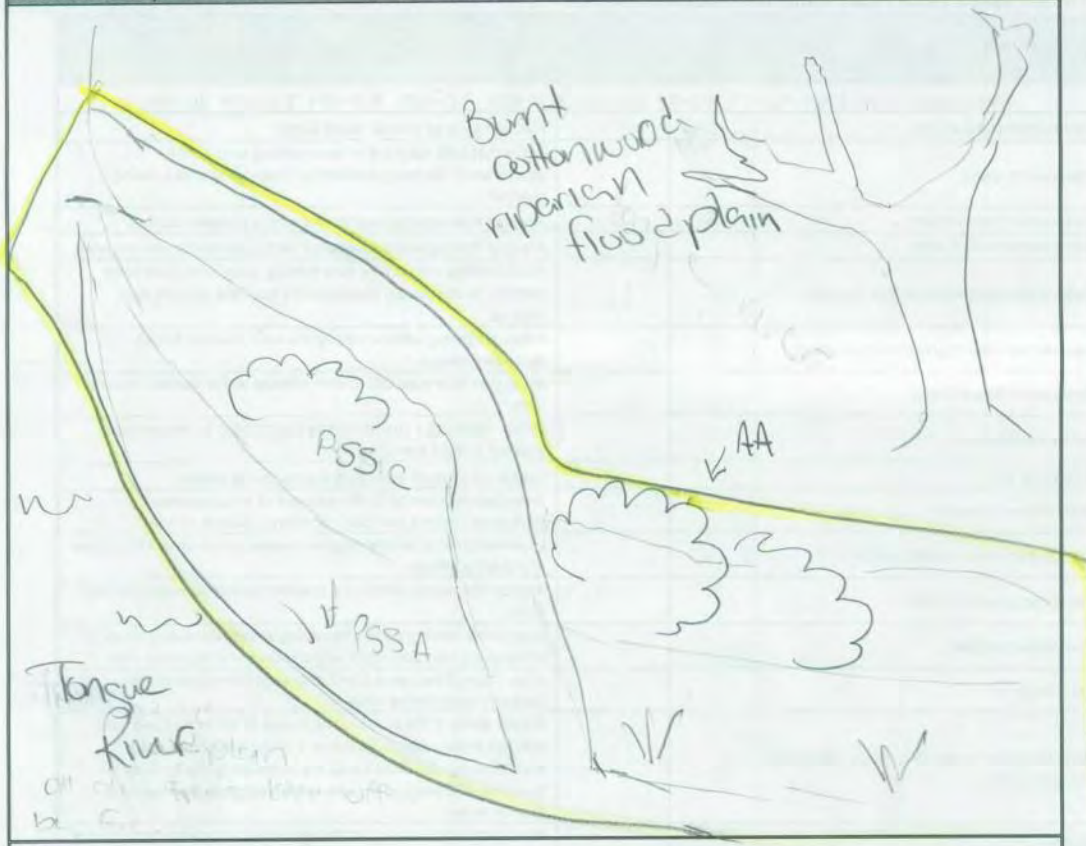
Montana Ecological Integrity Assessment Field Form 2015

ASSESSMENT AREA INFORMATION				
Site ID <u>McRae 01</u>		Visit # <u>1</u>		Date <u>7/15/2015</u>
Site Name <u>Tongue River floodplain</u>		Level 2 ☒ Level 3 ☐		Observer(s) <u>K. Rasmussen</u>
Level 4 Ecoregion				
Land Ownership <u>McRae</u>			Is this a mitigation wetland? Y (N)	
USGS Quad Name			Pre-construction Visit # <u>X</u>	
HUC4/HUC5/HUC6			Post-construction Visit #	
Slope 1 (°) <u>1</u>		Aspect 1 (°) <u>150</u>		AA is: ☐ Centered on original target coordinates ☒ Not centered on original target coordinates ☐ Shifted but within 60 m of the original target coordinates
Slope 2 (°)		Aspect 2 (°)		
GPS Coordinate Info				
Target AA Center Coordinates: Latitude (Y)		Longitude (X)		Dimensions of AA: ☐ 40 m radius circle ☐ Rectangle, width _____ length _____ ☒ Other, describe below and take a GPS track
GPS Unit Info. and Unit #:				
Actual AA Center Coordinates:				
Waypoint ID <u>McRae AAC</u>		Accuracy (m)		Percent of AA that is upland (not wetland). THIS CANNOT BE MORE THAN 10% OF THE AA.
Datum		Elevation (m)		
Latitude (Y)		Longitude (X)		
If AA is not a 40 m radius circle, record GPS coordinate information below:				
	Waypoint ID	Latitude (Y)	Longitude (X)	Accuracy (m)
AA Corner #1				
AA Corner #2				
AA Corner #3				
AA Corner #4				
AA Track	Track Name:		Comments:	
General AA description, including surrounding uplands			Directions to AA and Access Comments:	
<u>AA is on floodplain of Tongue river</u>				
Topographic Position (check one)		Amount of AA Covered by Standing Water (check one)		Estimated Depth of Standing Water (check one)
slope		none		< 0.5 m
floodplain ☒		51-75%		1-2 m
toeslope		1-25%		0.5 - < 1 m
valley bottom		76-100%		> 2 m
basin floor		26-50%		
Surface Water Permanence (check one)				
Semipermanent				
Seasonal				
Temporary ☒				
Assessment Area Photos-Taken from the center of the AA in the four cardinal directions				
Camera Information:				
Photo #		N	Description:	
Photo #		E		
Photo #		S		
Photo #		W		
Site Overview Photo #	Aspect	(a)	<u>100-00024, 0023</u>	
Additional Photos:				

Site ID McBee 01

CLASSIFICATION			
Ecological System (check one--use Key to Ecological Systems): ☐ GP Prairie Pothole ☐ RM Fen ☐ WGP Saline Depression ☐ RM Wet Meadow ☐ WGP Open Depression ☐ LM Riparian Woodland and Shrubland ☐ WGP Closed Depression ☐ RM Riparian Shrubland ☐ W. N. Am. Emergent Marsh ☐ RM Riparian Woodland ☒ <u>NWGP Riparian/Floodplain</u> ☐ NRM Wooded Vernal Pool ☐ Other		Confidence Level: ☐ Very High ☒ Medium ☐ High ☐ Low Reason for selecting confidence level: <u>wetland component from low wet meadow</u>	
HGM Class (check one-use Key to Hydrogeomorphic Classes): ☐ Slope ☐ Lacustrine Fringe ☐ Depressional ☒ <u>Riverine (floodplain)*</u> ☐ Flat ☐ Specific classification and metrics apply to the Riverine HGM Class Confidence Level: ☒ Very High ☐ Medium Reason for selecting confidence level: ☐ High ☐ Low <u>on flood plain of large river</u>		Has the wetland been anthropogenically altered (impounded, diked, ditched, drained, etc.)? N Has this wetland been artificially created, enhanced, or restored? N	
Cowardin Classification (check all that apply-use Key to Cowardin Systems):			
Cowardin System ☒ Palustrine (P)		Cowardin Class ☐ Aquatic Bed (AB) ☐ Unconsolidated Bottom (UB) ☐ Unconsolidated Shore (US) ☒ Emergent (EM) ☒ <u>Scrub-Shrub (SS)</u>	
☐ Lacustrine Littoral (L2)		☐ Aquatic Bed (AB) ☐ Unconsolidated Bottom (UB) ☐ Unconsolidated Shore (US)	
Cowardin Water Regimes: For L2UB, L2AB OR PAB, PUB ☐ Intermittently Exposed (G): surface water is present all year except in years of extreme drought ☐ Sempermanently Flooded (F): surface water persists throughout the growing season in most years; if surface water absent, water table at/near the surface ☐ Artificially Flooded (K): amount and duration of flooding completely controlled by artificial means (dikes, dams, pumps)			
For PEM, PSS, PFO ☐ Sempermanently Flooded (F): surface water persists throughout the growing season in most years; if surface water absent, water table at/near the surface ☒ Seasonally Flooded (C): surface water is present early in the growing season, but absent by the end of the season in most years; if surface water absent, water table is often near the surface ☐ Saturated (B): saturated to the surface during the growing season; surface water seldom present ☒ Temporarily Flooded (A): surface water present for brief periods early in the growing season; water table lies well below the surface for most of the growing season; both upland and wetland plants present ☐ Intermittently Flooded (J): substrate usually exposed; flooded for variable periods without detectable seasonal periodicity; may have weeks, months, years between inundation periods. The sites are often saline/alkaline			
For L2US, PUS ☐ Seasonally Flooded (C): surface water is present early in the growing season, but absent by the end of the season in most years; if surface water absent, water table is often near the surface ☐ Temporarily Flooded (A): surface water present for brief periods early in the growing season; water table lies well below the surface for most of the growing season; both upland and wetland plants present ☐ Intermittently Flooded (J): substrate usually exposed; flooded for variable periods without detectable seasonal periodicity; may have weeks, months, years between inundation periods. The sites are often saline/alkaline Cowardin Special Modifiers ☐ Beaver (b) ☐ Excavated (x) ☐ Partially ditched/draind (d) ☐ Diked/impounded (h)			
Cowardin Code <u>PESC</u> <u>PSSA</u> <u>PEMC</u>		% of AA <u>65</u> <u>25</u> <u>10</u>	

ASSESSMENT AREA DRAWING (add north arrow, document plant zones, indicate direction of drainage into or out of wetland, and include sketch of vegetation plot and soil pit placement). ALSO INDICATE ALL PLANT ZONES ON AERIAL PHOTO, IF POSSIBLE



Notes:

Site is recovering post fire. likely more invasive than prior to fire. Site recovery is impacted by heavy grazing from cattle primarily but also from native animal species. Many tracks seen on lower floodplain with a lot of evidence of heavy use by natives. Good biodiversity. At least 2 m. leopard frogs and several diamond flies seen on walk through. Shore would have been somewhat dominated by young Salix exigua.

Land owner noted that there are tipi rings and other evidence of being by N. Americans on bluffs to the N of site by where Spring fed / summer fed wetland is. Several species of bird seen during field work.

Site ID Melec 01

Physical Patch Types	How many physical patch types occur within the site (refer to physical patch type table below)?	2
----------------------	---	---

List of Physical Patch Types within the Assessment Area

PHYSICAL PATCH TYPE	Present in AA	Percent Cover within AA	Description
Cover Classes 1: trace 2: <1% 3: 1-2% 4: 2-5% 5: 5-10% 6: 10-25% 7: 25-50% 8: 50-75% 9: 75-95% 10: >95%			
Open water-pond or lake			Medium to large natural water body
Open water -pools			Areas that hold stagnant or slow moving water from groundwater discharge but are not associated with a defined channel.
Open water-river/stream		3	Areas of flowing water associated with a sizeable channel.
Open water-small rivulet			Areas of flowing water associated with a narrow stream channel.
Open water-oxbow/backwater channel		6	Areas holding stagnant or slow moving water that have been partially or completely disassociated from the primary river channel.
Open water-tributary/secondary channel			Areas of flowing water entering the main channel from a secondary source.
Open water-beaver pond			Areas that hold stagnant or slow moving water behind a beaver dam.
Active beaver dam			Debris damming a stream clearly constructed by beaver (note gnawed ends of branches)
Beaver canals			Canals cut through emergent vegetation by beaver.
Braided river channel			River channel consisting of a network of small channels separated by small and often temporary islands or bars.
Adjacent or onsite springs/seeps			Localized point of emerging groundwater, often on or at the base of a sloping hillside.
Debris jams/woody debris			Aggregated woody debris in a stream channel deposited by high flows.
Pool/riffle complex			Deep, slow-moving pools alternating with shallow, fast-moving riffles along the relatively straight course of a stream or river.
Point bars			A low ridge of sediment (sand or gravel) formed on the inner bank of a meandering stream.
Bank slumps or undercut banks in channel or along shoreline			A bank slump is the portion of a stream or other wetland bank that has broken free from the rest of the bank but has not eroded away. Undercut banks are areas along the bank or shoreline of a wetland that have been excavated by waves or flowing water.
Mudflats			An accumulation of mud at the edge of shallow waters, such as a lake or pond. Often intermittently flooded or exposed.
Salt flat/alkali flat			Dry open area of fine-grained sediment and accumulated salts. Often wet in the winter months or with heavy precipitation.
Animal mounds or burrows			Mounds or holes associated with animal foraging, denning, predation, or other behaviors.
Plant hummocks			A mound composed of plant material resulting in a raised pedestal of persistent roots or rhizomes.
Water tracks/hollows			Depressions between hummocks or mounds that remain permanently saturated or inundated with slow moving surface water.
Natural island			Naturally occurring islands surrounded by water. Island can be dominated by either wetland or upland vegetation.
Anthropogenic island			Island created by artificial means, often for nesting waterfowl.
Floating mat			Mats of peat held together by roots and rhizomes of sedges. Floating mats are underlain by water and /or very loose peat.
Marl/limonite beds			Marl is a calcium carbonate precipitate often found in calcareous fens. Limonite forms in iron-rich fens when iron precipitates from the groundwater incorporating organic matter.
Other:			

Identify and describe the plant zones that occur within the assessment area. Identify the dominant plant species within each stratum. To be considered a separate plant zone, it must make up more than 5% of the AA (e.g., 250 m² for an AA of 0.5 ha).

Plant Zones in Entire Assessment Area

Height Scale for Each Plant Zone

1	<0.5 m	6	10-15 m
2	0.5-1 m	7	15-20 m
3	1-2 m	8	20-35 m
4	2-5 m	9	35-50 m
5	5-10 m	10	>50 m

Cover Scale for Each Plant Zone

1	Trace	6	10-<25%
2	<1%	7	25-<50%
3	1-<2%	8	50-<75%
4	2-<5%	9	75-<95%
5	5-<10%	10	>95%

Stratum

(FO) Forest/Woodland (Trees/Shrubs > 5 m)

(SH) Shrubland (Shrubs >0.5-5 m)

(DS) Dwarf Shrubland (<0.5 m)

(H) Herbaceous (e.g., Graminoids, Forbs, Ferns)

(NV) Nonvascular (Bryophytes, cryptogamic crusts)

(V) Vines

(SF) Submerged/Floating (Rooted or floating-exclude emergent)

(SV) Sparsely Vegetated (including bare ground)

(CW) Coarse Woody Debris (≥ 7.6 cm in diameter)

(FW) Fine Woody Debris (≤ 7.5 cm in diameter)

Plant Zone #1 (Indicate location on site drawing)

Herbaceous wetland

Stratum	Dominant Species	Height Class	Cover Class	Comments
H	<i>Carex</i> sp.	1	6	
H	<i>Spartina pectinacea</i>	1	6	FACW
SH	<i>Salix anglica</i>	2	7	FACW
H	<i>Scheuchzeria palustris</i>	1	5	OBL
H	<i>Eleocharis palustris</i>	1	4	OBL
H	<i>Xanthoxylum</i>	1	3	FACW
H	<i>Rumex crispus</i>	1	3	FAC
H	<i>Phalaris amabilis</i>	1	5	FACW

F2

Plant Zone #2 (Indicate location on site drawing)

Stratum	Dominant Species	Height Class	Cover Class	Comments
H	<i>Agrostis stolonifera</i>	1	5	FACW
H	<i>Aster</i> sp.	1	2	
SH	<i>Rosa woodsii</i>	1	4	FACU
SH	<i>Potamogeton amplifolius</i>	1	3	recruitment
SH	<i>Symphoricarpos occidentalis</i>	1	2	FACU
H	<i>Cirsium arvense</i>	1	1	FACU
H	<i>Alliaria triquetra</i>	1	1	

→

continued recruitment

Site ID McCoo

#2
Riparian
Shrub

Plant Zone #2				
Stratum	Dominant Species	Height Class	Cover Class	Comments
SH	<i>Symphoricarpos occidentalis</i>	1	7	FACU
SH	<i>Rosa woodsii</i>	1	6	FACU
SH	<i>Shepherdia argentea</i>	4	8	UPL
H	<i>Arctium minus</i>	1	3	FACU
FO	<i>Fragaria pensylvanica</i>	5	6	FAC
SH	<i>Prunus virginiana</i>	4	6	FACU
H	<i>Cirsium arvense</i>	2	5	FACU

Plant Zone #3 (Indicate location on site drawing)				
Stratum	Dominant Species	Height Class	Cover Class	Comments
H	<i>Geum</i> sp.	1	2	no inflorescence
H	<i>Ospargus officinalis</i>	1	2	FACU
H	<i>Monarda fistulosa</i>	2	3	UPL

Plant Zone #5 (Indicate location on site drawing)				
Stratum	Dominant Species	Height Class	Cover Class	Comments

Percent of Each Plant Zone Within the AA		
Plant Zone	% of AA	Comments
1	75	healthy cottonwood recruitment all approx. 15cm-30cm tall
2	25	riparian shrub wetland area
3		
4		
5		

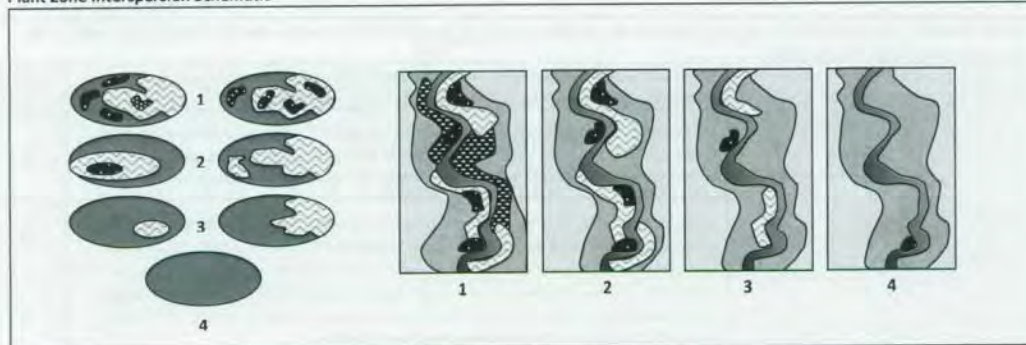
1. Landscape Context Metrics — Circle the applicable number

LANDSCAPE CONTEXT			
Landscape Connectivity within 200 m of the AA perimeter			
For non-riverine wetlands, select the statement that best describes the landscape connectivity within a 200 m envelope around the AA perimeter (refer to site map).	Intact: AA embedded in >90-100% unfragmented, natural landscape.		1
	Variegated: AA embedded in >75-90% unfragmented, natural landscape.		2
	Fragmented: AA embedded in >50-75% unfragmented, natural landscape.		3
	Severely fragmented: AA embedded in 25-50% unfragmented, natural landscape.		4
	Relictual: AA embedded in <25 % unfragmented, natural landscape.		5
For riverine wetlands, select the statement that best describes the landscape connectivity within a 200 m envelope upstream and downstream of the AA perimeter (refer to the site map).	Intact: AA embedded in >90-100% unfragmented, natural landscape.		1
	Variegated: AA embedded in >75-90% unfragmented, natural landscape.		2
	Fragmented: AA embedded in >50-75% unfragmented, natural landscape.		3
	Severely fragmented: AA embedded in 25-50% unfragmented, natural landscape.		4
	Relictual: AA embedded in <25 % unfragmented, natural landscape.		5
Buffer Length			
Select the statement that best describes the buffer length around the AA perimeter.	A buffer of at least 30 m occurs around 76-100% of the AA perimeter.		1
	A buffer of at least 30 m occurs around 51-75% of the AA perimeter.		2
	A buffer of at least 30 m occurs around 25-50% of the AA perimeter.		3
	A buffer of at least 30 m occurs around <25% of the AA perimeter, OR NO BUFFER EXISTS.		4
Buffer Width: Select the statement that best describes the buffer width of the AA. Estimate width up to 200 m from AA perimeter at eight evenly spaced intervals. Draw a 'pie' on your aerial photo and determine buffer width for each section.			
N <u>250</u>	S <u>200</u>	Average buffer width between edge of the AA and the edge of the buffer is >200 m.	1
NE <u>200</u>	SW <u>200</u>	Average buffer width between edge of AA and the edge of the buffer is >100-200 m.	2
E <u>200</u>	W <u>180</u>	Average buffer width between edge of the AA and the edge of the buffer is 50-100 m.	3
SE <u>200</u>	NW <u>200</u>	Average buffer width between edge of the AA and the edge of the buffer is <50 m, OR no buffer exists.	4
Average Buffer Width: <u>197.8</u>			
Buffer Condition within 200 m of the AA perimeter			
Select the statement that best describes the plant species composition within a 200 m envelope around the AA perimeter.	Abundant (>95%) native vegetation cover and little or no (<5%) cover of non-native plants.		1
	Substantial (>75-95%) native vegetation cover and low (5-25%) cover of non-native plants.		2
	Moderate (50-75%) native vegetation cover.		3
	Low (<50%) cover of native vegetation, OR NO BUFFER EXISTS.		4
Select the statement that best describes the extent of soil disturbance composition within a 200 m envelope around the AA perimeter.	Soils are intact.		1
	Soils are slightly to moderately disturbed.		2
	Soils are moderately to extensively disturbed.		3
	Soils are highly disturbed OR ground is unnaturally bare, OR NO BUFFER EXISTS.		4
Select the statement that best describes the extent of trash or evidence of human visitation within 200 m of the AA perimeter.	No trash present OR no evidence of human visitation or recreation.		1
	Little trash OR evidence of minor human visitation or recreation.		2
	Moderate or greater amounts of trash OR evidence of moderate human visitation/recreation.		3
	Excessive amounts of trash OR evidence of high intensity human visitation/recreation, OR NO BUFFER EXISTS.		4

2. Vegetation Metrics—Circle the applicable number

VEGETATION		
Relative cover of native plant species within the AA		
Select the statement that best describes the relative cover of native plant species within the AA.	>99% of the vegetation cover within the AA is comprised of native vegetation.	1
	95-99% of the vegetation cover within the AA is comprised of native vegetation.	2
	80-94% of the vegetation cover within the AA is comprised of native vegetation.	3
	50-80% of the vegetation cover within the AA is comprised of native vegetation.	4
	<50% of the vegetation cover within the AA is comprised of native vegetation.	5
Relative cover of listed noxious weed species within the AA (see State/County Noxious Weed list)		
Select the statement that best describes the relative cover of listed noxious weed species within the AA. Identify and rank the three most common noxious weed species observed in the AA. 1) <u>Drumstick</u> 2) _____ 3) _____	No noxious weed species are present in the AA.	1
	<1-3% of the vegetation cover within the AA is comprised of noxious weed species. If weeds occur in patches, then patches are small and isolated (1-2 patches) within the AA.	2
	>3-10% of the vegetation cover within the AA is comprised of noxious weed species. If weeds occur in patches, then patches are moderate in size and common (3-5 patches) within the AA.	3
	>10% of the vegetation cover within the AA is comprised of noxious weed species. If weeds occur in patches, then patches are relatively large and abundant (>5 patches) within the AA.	4
Relative cover of aggressive graminoids within the AA		
Select the statement that best describes the relative cover of aggressive graminoids within the AA. Identify and rank the three most common aggressive graminoids observed in the AA. 1) <u>Proseris cuneifolia</u> 2) _____ 3) _____	No aggressive graminoid species are present in the AA.	1
	Aggressive graminoids are present in the AA, but with low cover (<10% relative cover of cattails or <5% cover of reed canarygrass, common reed, smooth brome, Kentucky bluegrass, common timothy, or meadow foxtail).	2
	Aggressive graminoids are common in the AA (10-25% relative cover of cattails or 5-10% relative cover of reed canarygrass, common reed, smooth brome, Kentucky bluegrass, common timothy, or meadow foxtail).	3
	Aggressive graminoids are abundant in the AA (>25-50% relative cover of cattails or 10-25% relative cover of reed canarygrass, common reed, smooth brome, Kentucky bluegrass, common timothy, or meadow foxtail).	4
	Aggressive graminoids are dominant in the AA (>50% relative cover of cattails or >25% relative cover of reed canarygrass, common reed, smooth brome, Kentucky bluegrass, common timothy, or meadow foxtail).	5
Herbaceous Litter/Woody Debris Accumulation within the AA		
Select the statement that best describes the herbaceous litter/woody debris accumulation of the site. Note: Site must have the potential to accumulate woody debris (i.e., woody plant species should be present at the site).	Site has moderate amount of fine litter/woody debris. New growth is more prevalent than previous years' growth. Layers of litter in pools or areas of topographic lows are thin.	1
	Site is characterized by small amounts of litter/woody debris, with little plant recruitment, OR litter/woody debris is somewhat excessive.	2
	Site has scant litter/woody debris OR litter/woody debris is excessive and is blocking plant recruitment.	3
Interspersion of Plant Zones within the AA		
Select the statement that best describes the patch interspersion of the site (use the associated schematics).	Horizontal structure consists of a very complex array of nested or interspersed irregular biotic patches with no single dominant type.	1
	Horizontal structure consists of a moderately complex array of nested or interspersed irregular biotic patches with no single dominant type.	2
	Horizontal structure consists of a simple array of nested or interspersed irregular biotic patches with no single dominant type.	3
	Horizontal structure consists of one dominant patch type with no interspersion.	4

Plant Zone Interspersion Schematic



Woody Species Establishment and Regeneration within the AA		
Select the statement that best describes woody species establishment and regeneration within the AA.	All age classes of native woody species present OR woody species are naturally uncommon or absent.	1
	Middle age group(s) absent. All other well-represented.	2
	Seedlings and saplings and middle age group(s) absent. The stand is comprised mainly of mature species.	3
	Woody species predominately consist of relict or dying individuals or AA has a > 5% canopy cover of Russian Olive and/or Salt Cedar.	4
Utilization of Trees and Shrubs with the AA		
Select the statement that best describes the utilization of trees and shrubs in the AA.	0-5% of the available second year and older stems are browsed OR woody species are naturally uncommon or absent.	1
	>5%-25% of the available second year and older stems are browsed.	2
	>25%-50% of the available second year and older stems are browsed.	3
	More than 50% of the available second year and older stems are browsed.	4

3. Physicochemical Metrics—Circle the applicable number.

PHYSICOCHEMICAL		
Soil Surface Integrity within the AA		
Select the statement that describes the soil surface integrity within the AA.	Soil disturbance is limited to naturally caused disturbances such as flood deposition or game trails.	1
	Soil disturbance due to human causes (including livestock) is present but minimal. Depth of disturbance is limited to a few inches and does not show evidence of ponding or channeling water. Site will recover within a few years after disturbance removal.	2
	Soil disturbance due to human causes is common and will be slow to recover. Damage is not excessive and the site will recover with the removal of degrading human influences and moderate recovery times.	3
	Soil disturbance is widespread and substantially degrades the site. Water, if present, would be channeled or ponded. The site will not recover without restoration and/or long recovery times.	4

Site ID McCree 01

Water Quality: Select the statements that best describe the following water quality indicators within the AA. <u>If there is no water in the AA, then leave these metrics blank.</u>		
Algae	No visual evidence of degraded water quality. No potential source of water quality degradation observed. Water is clear with minimal algae growth.	<u>1</u>
	Some negative water quality indicators are present and/or some potential sources of water quality degradation observed. Algae are limited to small and localized areas within the wetland. Water may have a minimal greenish tint, cloudiness, or sheen.	2
	Algal growth occurs in large patches throughout the AA. Potential sources of water quality degradation are apparent. Water may have a moderate greenish tint or sheen.	3
	Algal mats may be extensive, blocking light to the bottom. Potential sources of water quality degradation are apparent. Water has strong greenish tint, sheen, or turbidity. The bottom is difficult to see during the growing season.	4
Turbidity	No visual evidence of degraded water quality. No potential source of water quality degradation observed.	1
	Water is slightly cloudy and/or some potential sources of water quality degradation observed, but there is no obvious source of sedimentation	2
	Water is cloudy, but the bottom is still visible. Potential sources of water quality degradation are apparent.	3
	Water is milky and/or muddy. The bottom is no longer visible. Potential sources of water quality degradation are apparent.	<u>4</u>
Sheen (petroleum-based) Note: Sheens can be caused by bacteria. When disturbed, a bacterial sheen will break up into small platelets; petroleum sheens will quickly reform.	No visual evidence of degraded water quality. No potential source of water quality degradation observed. Water is clear with no sheen.	<u>1</u>
	Some negative water quality indicators are present and/or some potential sources of water quality degradation observed. Sheen on the water is limited to small and localized areas within the AA.	2
	Sheen occurs in large patches throughout the surface water of the AA. Potential sources of water quality degradation are apparent. Water may have a moderate sheen.	3
	Sheen is extensive throughout the surface of the water in the AA. Potential sources of water quality degradation are apparent. Water has a strong sheen.	4

4. Hydrologic Metrics—Circle the applicable number.

HYDROLOGY		
Water Inputs into the AA		
Select the statement that best describes the water sources into the AA during the growing season.	Sources are precipitation, groundwater, and/or natural runoff, or natural flow from an adjacent freshwater body, or the AA naturally lacks water in the growing season.	1
	Sources are mostly natural but can include occasional or small effects of modified hydrology. No large point sources or dams control the overall hydrology.	2
	Sources are primarily from anthropogenic sources (e.g., urban runoff, pumped water, impoundments, regulated releases through a dam).	3
	Natural sources have been eliminated based on the following indicators: impoundment of all possible wet season inflows, diversions of all dry-season inflows, predominance of xeric vegetation, etc.	4
Rank major water sources observed in the AA, or observed to potentially impact the AA, starting with 1 being the most dominant through 3. Mark all others present with a 4 and those not present as NA.	Natural Sources:	Count of Discrete Inlets:
	Overbank flooding 1	Channels 2
	Alluvial storage/hyporheic flow 1	Spring
	Throughflow	Ditches
	Groundwater discharge 4	Culvert
	Precipitation 3	Pipes
	Snowmelt 4	Pumps
	Anthropogenic Sources:	Other/Comments:
	Irrigation run-off/ditches	are catons/backwater channel
	Urban run-off	
Pipes directly feeding into wetland		
Culvert		
Pumps		
Other:		
Water Outlet of the AA		
Select the statement that best describes the water outlet of the AA during the growing season.	Water leaves the site through natural runoff, natural flow, evaporation, or outlet is blocked by natural features (e.g., beaver dam), OR the site naturally lacks water in the growing season.	1
	Outflow is mostly natural, but there is some modification due to anthropogenic restrictions (e.g., filling or development, channelization).	2
	Withdrawals are primarily from anthropogenic sources, and outflow has been significantly altered by flow obstructions (culverts, paved stream crossings, impoundments, ditching).	3
	Natural outflow has been completely eliminated due to the following indicators: dike/levees, railroads, or roads with no culverts.	4
Rank major water outlets observed in the AA, or observed to potentially impact the AA, starting with 1 being the most dominant through 3. Mark all others present with a 4 and those not present as NA.	Natural Sources:	Count of Discrete Outlets:
	Channelized flow (headwater wetland)	Channels 1
	Recharge to adjacent stream 1	Culvert
	Throughflow	Ditches
	Non-channelized flow to contiguous wetland area 2	Pumps
	No natural outlet	Other/Comments:
	Anthropogenic Sources:	
	Culverts under roadways / trails	
	Ditches established to drain wetland	
	Natural outlet blocked/bermed	
Water is being pumped out of wetland		
Other:		

Hydroperiod of the AA (for depressional, lacustrine, and slope wetlands--NOT fens)		
Select the statement that best describes the hydroperiod of the AA. <i>large water dam</i>	Hydroperiod of the AA is characterized by natural patterns of filling or inundation and drying or drawdowns.	1
	The filling or inundation patterns in the AA are of greater magnitude or duration than would be expected under natural conditions, but thereafter the AA is subject to natural drawdown or drying.	2
	Hydroperiod of the AA is characterized by natural patterns of filling or inundation, but thereafter, is subject to more rapid or extreme drawdown or drying, as compared to more natural wetlands. OR the filling or inundation patterns in the AA are of substantially lower magnitude or duration than would be expected under natural conditions, but thereafter, the AA is subject to natural drawdown or drying.	3
	Both the inundation and drawdown of the AA deviate from natural conditions (either increased or decreased in magnitude and/or duration).	4
Hydroperiod of the AA (for fens)		
Select the statement that best describes the hydroperiod of the AA.	Hydroperiod of the AA is characterized by stable, saturated hydrology, or by naturally damped cycles of saturation and partial drying.	1
	Hydroperiod of the AA experiences minor altered inflows or drawdown/drying, as compared to more natural wetlands (e.g., ditching).	2
	Hydroperiod of the AA is somewhat altered by greater increased inflow from runoff, or experiences moderate drawdown or drying, as compared to more natural wetlands (e.g., ditching).	3
	Hydroperiod of the AA is greatly altered by increased inflow from runoff or experiences large drawdown or drying, as compared to more natural wetlands (e.g., ditching).	4
Surface Water Connectivity of the AA (for depressional, lacustrine, and slope wetlands--NOT isolated fens)		
Select the statement that best describes the surface water connectivity of the site.	Water, when present, has unrestricted access into or out of the wetland. There are no artificial obstructions to surface water flow.	1
	Artificial obstructions limit the access of surface water into or out of the wetland, but the limitations exist for < 50% of the AA perimeter.	2
	Artificial obstructions limit the access of surface water into or out of the wetland for 50–90% of the AA perimeter. Flood flows may exceed the obstructions, but drainage into or out of the AA is probably obstructed.	3
	Artificial obstructions limit the access of surface water into or out of the wetland for >90% of the AA perimeter.	4
Surface Water Connectivity of the AA (for naturally isolated fens)		
Select the statement that best describes the surface water connectivity of the site.	No natural surface water connectivity with surrounding water bodies.	1
	Partial surface water connectivity with surrounding water bodies exists via artificial means (e.g., ditching or draining to dry the fen).	2
	Substantial to full surface water connectivity exists via artificial means that has obvious drying effects on the peat body.	3

Site ID McCrone 01

Onsite and Surrounding Disturbances—Indicate the Scope and Impact of disturbances (see tables on p. 14).

Disturbances Observed <u>and</u> Expected to Impact the Site	Scope		Impact		Field Indicator Observed
	200 m	AA	200 m	AA	
Transportation Disturbances					
Paved surfaces (e.g., roads, parking lots)					
Unpaved roads	1	0	1	1	
Railroads					
Land Use Disturbances-Development or Recreation					
Domestic or commercial development					
Intensively managed sports fields, golf courses					
Recreation or human visitation					
Filling or dumping of sediment or fill					
Trash or refuse dumping					
Land Use Disturbances-Agriculture					
Dryland farming (e.g., wheat, barley, etc.)					
Open range livestock grazing	4	4	3	3	Severe grazing
Horse paddock					
Feedlot					
Irrigated cropland					
Irrigated hay pasture					
Irrigation ditches affecting wetland					
Permanent tree plantation					
Cropland treated with pesticides					
Disturbed fallow lands dominated by exotic species					
Haying of native grassland					
Fallow fields (no human use in past 10 years)					
Fields with recent plowing or discing					
Shelterbelts					
Fences that impede wildlife					
Land Use Disturbances-Resource Extraction					
Gravel pits, open pit mining					
Small scale mining activity or abandoned mines					
Abandoned oil/gas wells					
Oil/gas pump jacks (active)					
Injection wells, tank batteries, collection facilities, or other oil/gas-associated infrastructure					
Intensive logging (50-75% trees of >50 cm diameter removed)					
Selective logging (<50% of trees >50 cm diameter removed)					

Site ID McPee 071

Disturbances Observed <u>and</u> Expected to Impact the Site	Scope		Impact		Field Indicator Observed
	200 m	AA	200 m	AA	
Land Use Disturbances-Vegetation Removal/Conversion					
Chemical vegetation control					
Evidence of intentional burning					
Mechanical vegetation removal					
Vegetation conversion (e.g., from shrubland to grassland)					
Natural or Environmental Disturbances					
Beetle-killed <i>Pinus</i> species					
Other diseased conifers					
Evidence of recent fire (<5 years)					
Beaver activity					
Evidence of prolonged drought					
Browsing of woody vegetation by native ungulates					
Hydrologic Disturbances					
Upstream spring box					
Impoundment of flowing water					
Potential for agricultural runoff					
Potential for urban runoff					
Culvert					
Upstream dam					
Reservoir/stock pond					
Weir or drop structure					
Dredged inlet/outlet channel					
Engineered channel (e.g., riprap)					
Pumps, diversions, or ditches that move water <i>into</i> wetland					
Pumps, diversions, or ditches that move water <i>out of</i> wetland					
Berms/Dikes/Levees					

Scope and Impact Ratings

Scope of Disturbances	
5	Pervasive – Affects nearly all (>75%) of the envelope or AA.
4	Large – Affects most (>50-75%) of the envelope or AA.
3	Moderate – Affects much (>25-50%) of the envelope or AA.
2	Restricted – Affects some (>10-25%) of the envelope or AA.
1	Small – Affects a small (1-10%) portion of the envelope or AA.
0	Nil – Affects little to none (<1%) of the envelope or AA.
Impact of Disturbances	
4	Extreme – likely to extremely modify, degrade, destroy, or eliminate the wetland.
3	Serious – likely to seriously modify, degrade or reduce wetland function or condition.
2	Moderate – likely to moderately modify, degrade or reduce wetland function or condition.
1	Slight – likely to only slightly modify, degrade, or reduce wetland function or condition.

SOIL PROFILE DATA FORM—Draw soil pit locations on site drawing

Depth of Standing Surface water (cm): _____

Depth to Saturation (cm): _____

Depth to free water in pit (cm) (NP=not present): _____

GPS Waypoint:
Latitude (Y): _____
Longitude (X): _____
Accuracy (m): _____

Module or Plant Zone: 1 Accuracy (m): _____

SOIL PROFILE DESCRIPTION

[illegible]

4. Redoximorphic features cannot form in soils with parent materials that are low in iron and manganese. To determine the soil matrix color: if soils are dry, wet sample until it no longer changes color. Always have the sun at your back when comparing to color chart to find best match.

meets hygienic soil indicator SS - sandy red x.

Site ID Helax 01

SOIL PROFILE DATA FORM—Draw soil pit locations on site drawing																		
Soil Pit #: <u>SP 2</u>		GPS Waypoint: Latitude (Y): _____		Longitude (X): _____		Depth of Standing Surface Water (cm): _____		Depth to Saturation (cm): _____		Depth to free water in pit (cm) (NP=not present): _____		Module or Plant Zone: <u>2</u>		Accuracy (m): _____				
SOIL PROFILE DESCRIPTION																		
Soil Layer	Depth to Lower Boundary of Layer	Soil Texture (Mineral Soils)	Soil Texture Modifier	If organic, indicate texture P = Peat M = Muck MP = Mucky Peat	% Visible plant fibers	Soil Matrix Color*			Redox Concentrations Features			Redox Depletion Features						
						H	V	C	Redox Concentration Abundance (%)	Redox Concentration Color	H	V	C	Redox Depletion Abundance (%)	Redox Depletion Color	H	V	C
1	0-14	Sandy clay loam				10YR	3	2										
2	14-42	Sandy clay loam				2.5Y	4	3	5 PL	7.5Y	5	6						
3	42-50+	loamy sand				2.5Y	4	3	5	7.5Y	4	6						
**Hydric Soil Indicators Observed (check all that apply):						Soil Profile Photos												
Histosol (Organic layer greater than 40 cm)						Photo # <u>0022</u> soil profile												
Histic Epipedon (Organic layer at least 20 cm from surface)						Photo # <u>0021</u> soil profile												
Sulfidic (rotten eggs) odor						Photo # _____												
Organic streaking (dark vertical streaks in the subsurface layers)						Photo # _____												
Gleyed or Low Chroma Colors						Photo # _____												
Remarks: <u>Layer 1 has organics 25N or blacker.</u>																		
#Redoximorphic features cannot form in soils with parent materials that are low in iron and manganese *To determine the soil matrix color: if soils are dry, wet sample until it no longer changes color. Always have the sun at your back when comparing to color chart to find best match.																		

Meet hydric soil indicator
sandy redox

Site ID McBae 02

Montana Ecological Integrity Assessment Field Form 2015

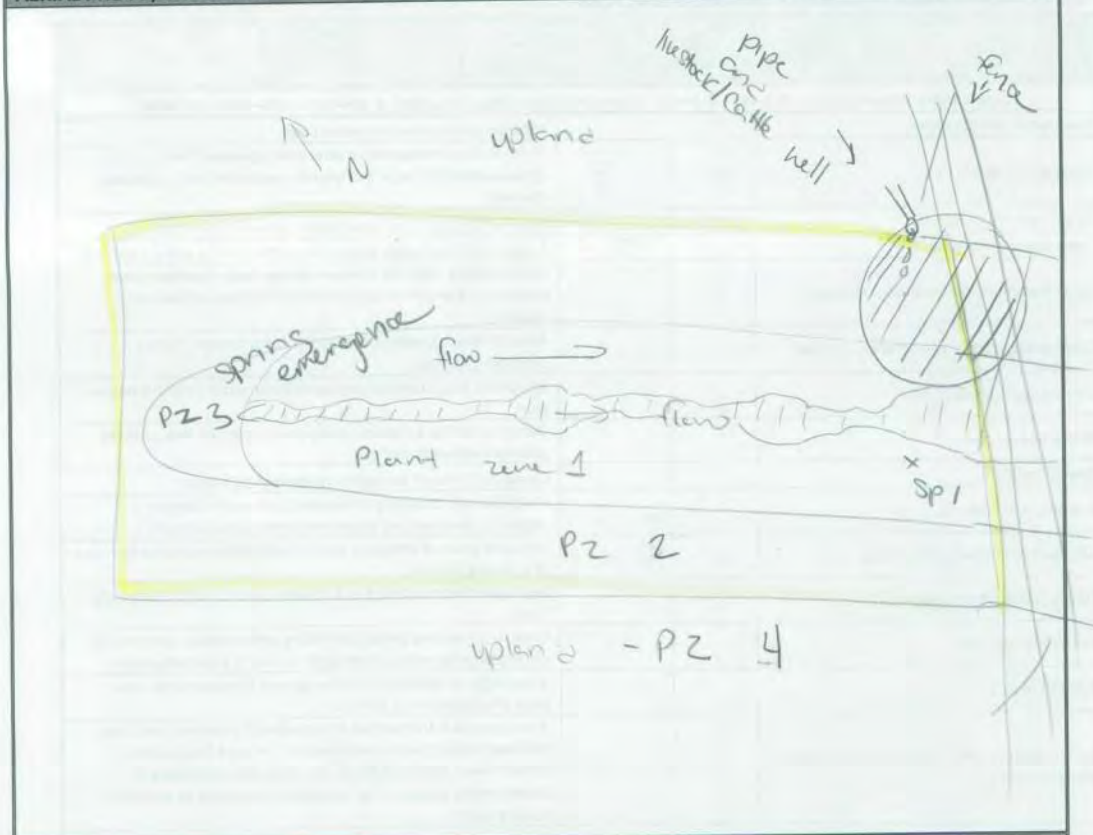
ASSESSMENT AREA INFORMATION				
Site ID <u>McBae 02</u>	Visit # <u>1</u>	Date <u>07/13/2015</u>		
Site Name <u>McBae Spring</u>	Level 2 ☒ Level 3 ☐	Observer(s) <u>K. Lamstead</u>		
Level 4 Ecoregion		Is this a mitigation wetland? Y ☐ N ☒		
Land Ownership <u>McBae</u>		Pre-construction Visit # _____		
USGS Quad Name		Post-construction Visit # _____		
HUC4/HUC5/HUC6		AA is: ☐ Centered on original target coordinates ☐ Not centered on original target coordinates ☒ Shifted but within 60 m of the original target coordinates		
Slope 1 (°) <u>2.5</u>	Aspect 1 (°) <u>110</u>	Dimensions of AA: ☐ 40 m radius circle ☐ Rectangle, width _____ length _____ ☒ Other, describe below and take a GPS track		
Slope 2 (°)	Aspect 2 (°)			
GPS Coordinate Info				
Target AA Center Coordinates: Latitude (Y)		Longitude (X)		
GPS Unit Info. and Unit #:				
Actual AA Center Coordinates:				
Waypoint ID <u>McBae Spring head</u>	Accuracy (m)	Percent of AA that is upland (not wetland). THIS CANNOT BE MORE THAN 10% OF THE AA. <u>< 3%</u>		
Datum	Elevation (m)			
Latitude (Y)	Longitude (X)			
If AA is not a 40 m radius circle, record GPS coordinate information below:				
	Waypoint ID	Latitude (Y)	Longitude (X)	Accuracy (m)
AA Corner #1				
AA Corner #2				
AA Corner #3				
AA Corner #4				
AA Track	Track Name:	Comments:		
General AA description, including surrounding uplands		Directions to AA and Access Comments:		
<u>Site is an emergent wetland found in a shallow that is fed by a spring.</u>				
Topographic Position (check one)		Amount of AA Covered by Standing Water (check one)		Estimated Depth of Standing Water (check one)
slope ☒ floodplain	none ☐ 51-75% ☐	< 0.5 m ☒ 1-2 m ☐		Surface Water Permanence (check one) ☐ Semipermanent ☒ Seasonal ☐ Temporary
toeslope ☐ valley bottom	1-25% ☐ 76-100% ☒	0.5 - < 1 m ☐ > 2 m ☐		
basin floor ☐	26-50% ☐			
Assessment Area Photos-Taken from the center of the AA in the four cardinal directions				
Camera Information:				
Photo # <u>0036</u>	N	Description:		
Photo # <u>0037</u>	E			
Photo # <u>0038</u>	S			
Photo # <u>0039</u>	W			
Site Overview Photo #	Aspect	<u>100-0027, 100-0028</u>		
Additional Photos:				

Site ID McB 02

CLASSIFICATION			
Ecological System (check one--use Key to Ecological Systems): ☐ GP Prairie Pothole ☐ WGP Saline Depression ☒ WGP Open Depression ☐ WGP Closed Depression ☐ W. N. Am. Emergent Marsh ☐ NWGP Riparian/Floodplain ☐ Other ☐ RM Fen ☐ RM Wet Meadow ☐ LM Riparian Woodland and Shrubland ☐ RM Riparian Shrubland ☐ RM Riparian Woodland ☐ NRM Wooded Vernal Pool		Confidence Level: ☒ Very High ☐ Medium ☐ High ☐ Low Reason for selecting confidence level:	
HGM Class (check one-use Key to Hydrogeomorphic Classes): ☒ Slope ☐ Depressional ☐ Flat ☐ Lacustrine Fringe ☐ Riverine (floodplain)* Specific classification and metrics apply to the Riverine HGM Class		Has the wetland been anthropogenically altered (impounded, diked, ditched, drained, etc.)? Yes	
Confidence Level: ☒ Very High ☐ Medium ☒ High ☐ Low Reason for selecting confidence level: Slope on a slope		Has this wetland been artificially created, enhanced, or restored? No	
Cowardin Classification (check all that apply-use Key to Cowardin Systems):			
Cowardin System ☒ Palustrine (P)		Cowardin Class ☐ Aquatic Bed (AB) ☐ Unconsolidated Bottom (UB) ☐ Unconsolidated Shore (US) ☒ Emergent (EM) ☐ Scrub-Shrub (SS)	
☐ Lacustrine Littoral (L2)		☐ Aquatic Bed (AB) ☐ Unconsolidated Bottom (UB) ☐ Unconsolidated Shore (US)	
Cowardin Water Regimes:			
For L2UB, L2AB OR PAB, PUB ☐ Intermittently Exposed (G): surface water is present all year except in years of extreme drought ☐ Semipermanently Flooded (F): surface water persists throughout the growing season in most years; if surface water absent, water table at/near the surface ☐ Artificially Flooded (K): amount and duration of flooding completely controlled by artificial means (dikes, dams, pumps)		For PEM, PSS, PFO ☒ Semipermanently Flooded (F): surface water persists throughout the growing season in most years; if surface water absent, water table at/near the surface ☒ Seasonally Flooded (C): surface water is present early in the growing season, but absent by the end of the season in most years; if surface water absent, water table is often near the surface ☒ Saturated (B): saturated to the surface during the growing season; surface water seldom present ☐ Temporarily Flooded (A): surface water present for brief periods early in the growing season; water table lies well below the surface for most of the growing season; both upland and wetland plants present ☐ Intermittently Flooded (J): substrate usually exposed; flooded for variable periods without detectable seasonal periodicity; may have weeks, months, years between inundation periods. The sites are often saline/alkaline	
For L2US, PUS ☒ Seasonally Flooded (C): surface water is present early in the growing season, but absent by the end of the season in most years; if surface water absent, water table is often near the surface ☐ Temporarily Flooded (A): surface water present for brief periods early in the growing season; water table lies well below the surface for most of the growing season; both upland and wetland plants present ☐ Intermittently Flooded (J): substrate usually exposed; flooded for variable periods without detectable seasonal periodicity; may have weeks, months, years between inundation periods. The sites are often saline/alkaline Cowardin Special Modifiers ☐ Beaver (b) ☐ Excavated (x) ☐ Partially ditched/draind (d) ☐ Diked/impounded (h)			
Cowardin Code	% of AA	Cowardin Code	% of AA
PEM C	65		
PEM B	30		
PAB F	5		

Site ID McLae 02

ASSESSMENT AREA DRAWING (add north arrow, document plant zones, indicate direction of drainage into or out of wetland, and include sketch of vegetation plot and soil pit placement). ALSO INDICATE ALL PLANT ZONES ON AERIAL PHOTO, IF POSSIBLE



Notes:

Near spring emergence site dominated by *Equisetum* and *Carex praegracilis*. Channel forms slightly SE of emergence. Within channel open water is dominated by *Lemna minor*. Wetland transitions to plant zone 2 as elevation on each side of shale increases. Areas 1-3A above channel there is a thin line that is dominated by *Hurdium jubatum* until upland is reached. Frogs here seen but disappeared too quickly to identify. Red-winged blackbirds and northern flicker using the area. Uplands and wetland fringes are fairly disturbed with some native species such as *Artemisia* *arbuscula*. Deep appears to run throughout the AA along the sides w/ one spr emergence. Pugging along both edges of plant zone 1 with some areas that had obvious signs of larger animal bedding down in wetland. Likely cattle.

There is a lot of small mammal activity seen around edges of wetland most likely 3 ves.

Physical Patch Types	How many physical patch types occur within the site (refer to physical patch type table below)?	3
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List of Physical Patch Types within the Assessment Area

PHYSICAL PATCH TYPE	Present in AA	Percent Cover within AA	Description
Cover Classes 1: trace 2: <1% 3: 1-2% 4: 2-5% 5: 5-10% 6: 10-25% 7: 25-50% 8: 50-75% 9: 75-95% 10: >95%			
Open water-pond or lake			Medium to large natural water body
Open water -pools	x	3	Areas that hold stagnant or slow moving water from groundwater discharge but are not associated with a defined channel.
Open water-river/stream			Areas of flowing water associated with a sizeable channel.
Open water-small rivulet	x	5	Areas of flowing water associated with a narrow stream channel.
Open water-oxbow/backwater channel			Areas holding stagnant or slow moving water that have been partially or completely disassociated from the primary river channel.
Open water-tributary/secondary channel			Areas of flowing water entering the main channel from a secondary source.
Open water-beaver pond			Areas that hold stagnant or slow moving water behind a beaver dam.
Active beaver dam			Debris damming a stream clearly constructed by beaver (note gnawed ends of branches)
Beaver canals			Canals cut through emergent vegetation by beaver.
Braided river channel			River channel consisting of a network of small channels separated by small and often temporary islands or bars.
Adjacent or onsite springs/seeps	x	8	Localized point of emerging groundwater, often on or at the base of a sloping hillside.
Debris jams/woody debris			Aggregated woody debris in a stream channel deposited by high flows.
Pool/riffle complex			Deep, slow-moving pools alternating with shallow, fast-moving riffles along the relatively straight course of a stream or river.
Point bars			A low ridge of sediment (sand or gravel) formed on the inner bank of a meandering stream.
Bank slumps or undercut banks in channel or along shoreline			A bank slump is the portion of a stream or other wetland bank that has broken free from the rest of the bank but has not eroded away. Undercut banks are areas along the bank or shoreline of a wetland that have been excavated by waves or flowing water.
Mudflats			An accumulation of mud at the edge of shallow waters, such as a lake or pond. Often intermittently flooded or exposed.
Salt flat/alkali flat			Dry open area of fine-grained sediment and accumulated salts. Often wet in the winter months or with heavy precipitation.
Animal mounds or burrows			Mounds or holes associated with animal foraging, denning, predation, or other behaviors.
Plant hummocks			A mound composed of plant material resulting in a raised pedestal of persistent roots or rhizomes.
Water tracks/hollows			Depressions between hummocks or mounds that remain permanently saturated or inundated with slow moving surface water.
Natural island			Naturally occurring islands surrounded by water. Island can be dominated by either wetland or upland vegetation.
Anthropogenic island			Island created by artificial means, often for nesting waterfowl.
Floating mat			Mats of peat held together by roots and rhizomes of sedges. Floating mats are underlain by water and /or very loose peat.
Marl/limonite beds			Marl is a calcium carbonate precipitate often found in calcareous fens. Limonite forms in iron-rich fens when iron precipitates from the groundwater incorporating organic matter.
Other:			

Identify and describe the plant zones that occur within the assessment area. Identify the dominant plant species within each stratum. To be considered a separate plant zone, it must make up more than 5% of the AA (e.g., 250 m² for an AA of 0.5 ha).

Plant Zones in Entire Assessment Area

Height Scale for Each Plant Zone				Cover Scale for Each Plant Zone			
1	<0.5 m	6	10-15 m	1	Trace	6	10-<25%
2	0.5-1 m	7	15-20 m	2	<1%	7	25-<50%
3	1-2 m	8	20-35 m	3	1-<2%	8	50-<75%
4	2-5 m	9	35-50 m	4	2-<5%	9	75-<95%
5	5-10 m	10	>50 m	5	5-<10%	10	>95%

Stratum

(FO) Forest/Woodland (Trees/Shrubs > 5 m)	(V) Vines
(SH) Shrubland (Shrubs >0.5-5 m)	(SF) Submerged/Floating (Rooted or floating-exclude emergent)
(DS) Dwarf Shrubland (<0.5 m)	(SV) Sparsely Vegetated (including bare ground)
(H) Herbaceous (e.g., Graminoids, Forbs, Ferns)	(CW) Coarse Woody Debris (≥ 7.6 cm in diameter)
(NV) Nonvascular (Bryophytes, cryptogamic crusts)	(FW) Fine Woody Debris (≤ 7.5 cm in diameter)

Plant Zone #1 (Indicate location on site drawing)

Stratum	Dominant Species	Height Class	Cover Class	Comments
H	<i>Juncus torreyi</i>	1	5	FACW
H	<i>Scheuchzeria</i>	2	8	
H	<i>Scheuchzeria pinnatifida</i>	2	6	OBL
H	<i>Rumex stenophyllus</i>	2	2	
H	<i>Epilobium</i>	1	2	
SF	<i>Lemna minor</i>	1	5	OBL
H	<i>Alopecurus pratensis</i>	1	5	OBL

Plant Zone #2 (Indicate location on site drawing)

Stratum	Dominant Species	Height Class	Cover Class	Comments
H	<i>Hordeum jubatum</i>	1	7	FACW
H	<i>Symphoricarpos falcatus</i>	1	4	
H	<i>Scheuchzeria pinnatifida</i>	2	8	OBL
H	<i>Alopecurus pratensis</i>	1	4	FACU
H	<i>Carex proserpicularis</i>	1	6	FACW
H	Unknown grass	1	4	

Site ID Malheur 02

Plant Zone #3 (Indicate location on site drawing)				
Stratum	Dominant Species	Height Class	Cover Class	Comments
H	<i>Equisetum laevigatum</i>	1	8	
H	<i>Carex proserpiculifolia</i>	1	7	FACW
H	<i>Poa pratensis</i>	1	6	FACU

upland

Plant Zone #4 (Indicate location on site drawing)				
Stratum	Dominant Species	Height Class	Cover Class	Comments
H	<i>Poa pratensis</i>	1	8	
H	<i>Trigonotis dubus</i>	1	4	
H	<i>Lactuca columnaris</i>	1	4	
H	<i>Medicago lupulina</i>	1	4	
H	<i>Artemisia cana</i>	1	4	
H	<i>Adiantum sp.</i>	1	3	
H	<i>Achillea millefolium</i>	1	4	

#4
upland

Plant Zone #5 (Indicate location on site drawing)				
Stratum	Dominant Species	Height Class	Cover Class	Comments
V	<i>Convolvulus arvensis</i>	1	3	
H	<i>Cirsium arvense</i>	2	4	
H	<i>Plantago major</i>	4	4	
H	<i>Sisymbrium loeselii</i>	2	5	

Percent of Each Plant Zone Within the AA		
Plant Zone	% of AA	Comments
1	50	most of PEMC
2	35	
3	15	only in the riparian zone
4		
5		

Site ID McDane 02

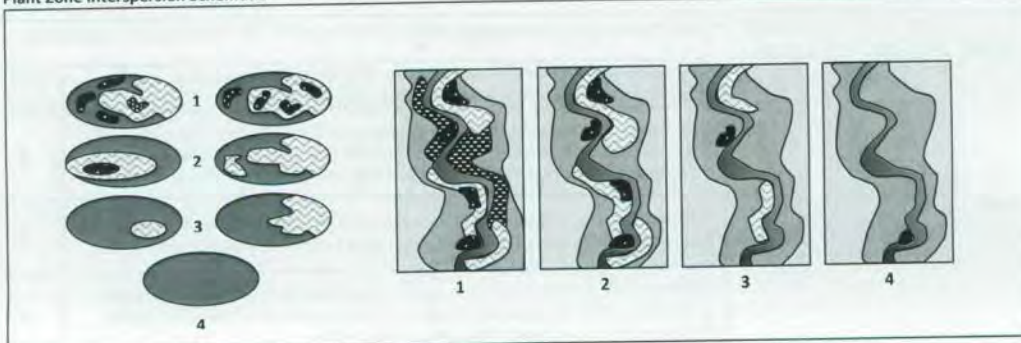
1. Landscape Context Metrics — Circle the applicable number

LANDSCAPE CONTEXT			
Landscape Connectivity within 200 m of the AA perimeter			
For <i>non-riverine</i> wetlands, select the statement that best describes the landscape connectivity within a 200 m envelope around the AA perimeter (refer to site map).	Intact: AA embedded in >90-100% unfragmented, natural landscape.		1
	Variegated: AA embedded in >75-90% unfragmented, natural landscape.		2
	Fragmented: AA embedded in >50-75% unfragmented, natural landscape.		3
	Severely fragmented: AA embedded in 25-50% unfragmented, natural landscape.		4
	Relictual: AA embedded in <25 % unfragmented, natural landscape.		5
For <i>riverine</i> wetlands, select the statement that best describes the landscape connectivity within a 200 m envelope upstream and downstream of the AA perimeter (refer to the site map).	Intact: AA embedded in >90-100% unfragmented, natural landscape.		1
	Variegated: AA embedded in >75-90% unfragmented, natural landscape.		2
	Fragmented: AA embedded in >50-75% unfragmented, natural landscape.		3
	Severely fragmented: AA embedded in 25-50% unfragmented, natural landscape.		4
	Relictual: AA embedded in <25 % unfragmented, natural landscape.		5
Buffer Length			
Select the statement that best describes the buffer length around the AA perimeter.	A buffer of at least 30 m occurs around 76-100% of the AA perimeter.		1
	A buffer of at least 30 m occurs around 51-75% of the AA perimeter.		2
	A buffer of at least 30 m occurs around 25-50% of the AA perimeter.		3
	A buffer of at least 30 m occurs around <25% of the AA perimeter, OR NO BUFFER EXISTS.		4
Buffer Width: Select the statement that best describes the buffer width of the AA. Estimate width up to 200 m from AA perimeter at eight evenly spaced intervals. Draw a 'pie' on your aerial photo and determine buffer width for each section.			
N <u>200</u>	S <u>20</u>	Average buffer width between edge of the AA and the edge of the buffer is >200 m.	1
NE <u>200</u>	SW <u>30</u>	Average buffer width between edge of AA and the edge of the buffer is >100-200 m.	2
E <u>170</u>	W <u>20</u>	Average buffer width between edge of the AA and the edge of the buffer is 50-100 m.	3
SE <u>50</u>	NW <u>200</u>	Average buffer width between edge of the AA and the edge of the buffer is <50 m, OR no buffer exists.	4
Average Buffer Width: <u>111.25</u>			
Buffer Condition within 200 m of the AA perimeter			
Select the statement that best describes the plant species composition within a 200 m envelope around the AA perimeter.	Abundant (>95%) native vegetation cover and little or no (<5%) cover of non-native plants.		1
	Substantial (>75-95%) native vegetation cover and low (5-25%) cover of non-native plants.		2
	Moderate (50-75%) native vegetation cover.		3
	Low (<50%) cover of native vegetation, OR NO BUFFER EXISTS.		4
Select the statement that best describes the extent of soil disturbance composition within a 200 m envelope around the AA perimeter.	Soils are intact.		1
	Soils are slightly to moderately disturbed.		2
	Soils are moderately to extensively disturbed.		3
	Soils are highly disturbed OR ground is unnaturally bare, OR NO BUFFER EXISTS.		4
Select the statement that best describes the extent of trash or evidence of human visitation within 200 m of the AA perimeter.	No trash present OR no evidence of human visitation or recreation.		1
	Little trash OR evidence of minor human visitation or recreation.		2
	Moderate or greater amounts of trash OR evidence of moderate human visitation/recreation.		3
	Excessive amounts of trash OR evidence of high intensity human visitation/recreation, OR NO BUFFER EXISTS.		4

2. Vegetation Metrics—Circle the applicable number

VEGETATION		
Relative cover of native plant species within the AA		
Select the statement that best describes the relative cover of native plant species within the AA.	>99% of the vegetation cover within the AA is comprised of native vegetation.	1
	95-99% of the vegetation cover within the AA is comprised of native vegetation.	2
	80-94% of the vegetation cover within the AA is comprised of native vegetation.	3
	50-80% of the vegetation cover within the AA is comprised of native vegetation.	4
	<50% of the vegetation cover within the AA is comprised of native vegetation.	5
Relative cover of listed noxious weed species within the AA (see State/County Noxious Weed list)		
Select the statement that best describes the relative cover of listed noxious weed species within the AA. Identify and rank the three most common noxious weed species observed in the AA. 1) <u>Cirsium arvense</u> 2) _____ 3) _____	No noxious weed species are present in the AA.	1
	<1-3% of the vegetation cover within the AA is comprised of noxious weed species. If weeds occur in patches, then patches are small and isolated (1-2 patches) within the AA.	2
	>3-10% of the vegetation cover within the AA is comprised of noxious weed species. If weeds occur in patches, then patches are moderate in size and common (3-5 patches) within the AA.	3
	>10% of the vegetation cover within the AA is comprised of noxious weed species. If weeds occur in patches, then patches are relatively large and abundant (>5 patches) within the AA.	4
Relative cover of aggressive graminoids within the AA		
Select the statement that best describes the relative cover of aggressive graminoids within the AA. Identify and rank the three most common aggressive graminoids observed in the AA. 1) <u>Poa pratensis</u> 2) _____ 3) _____	No aggressive graminoid species are present in the AA.	1
	Aggressive graminoids are present in the AA, but with low cover (<10% relative cover of cattails or <5% cover of reed canarygrass, common reed, smooth brome, Kentucky bluegrass, common timothy, or meadow foxtail).	2
	Aggressive graminoids are common in the AA (10-25% relative cover of cattails or 5-10% relative cover of reed canarygrass, common reed, smooth brome Kentucky bluegrass, common timothy, or meadow foxtail).	3
	Aggressive graminoids are abundant in the AA (>25-50% relative cover of cattails or 10-25% relative cover of reed canarygrass, common reed, smooth brome, Kentucky bluegrass, common timothy, or meadow foxtail).	4
	Aggressive graminoids are dominant in the AA (>50% relative cover of cattails or >25% relative cover of reed canarygrass, common reed, smooth brome, Kentucky bluegrass, common timothy, or meadow foxtail).	5
Herbaceous Litter/Woody Debris Accumulation within the AA		
Select the statement that best describes the herbaceous litter/woody debris accumulation of the site. Note: Site must have the potential to accumulate woody debris (i.e., woody plant species should be present at the site).	Site has moderate amount of fine litter/woody debris. New growth is more prevalent than previous years' growth. Layers of litter in pools or areas of topographic lows are thin.	1
	Site is characterized by small amounts of litter/woody debris, with little plant recruitment, OR litter/woody debris is somewhat excessive.	2
	Site has scant litter/woody debris OR litter/woody debris is excessive and is blocking plant recruitment.	3
Interspersion of Plant Zones within the AA		
Select the statement that best describes the patch interspersion of the site (use the associated schematics).	Horizontal structure consists of a very complex array of nested or interspersed irregular biotic patches with no single dominant type.	1
	Horizontal structure consists of a moderately complex array of nested or interspersed irregular biotic patches with no single dominant type.	2
	Horizontal structure consists of a simple array of nested or interspersed irregular biotic patches with no single dominant type.	3
	Horizontal structure consists of one dominant patch type with no interspersion.	4

Plant Zone Interspersion Schematic



Woody Species Establishment and Regeneration within the AA		
Select the statement that best describes woody species establishment and regeneration within the AA.	All age classes of native woody species present OR woody species are naturally uncommon or absent.	1
	Middle age group(s) absent. All other well-represented.	2
	Seedlings and saplings and middle age group(s) absent. The stand is comprised mainly of mature species.	3
	Woody species predominately consist of relict or dying individuals or AA has a > 5% canopy cover of Russian Olive and/or Salt Cedar.	4
Utilization of Trees and Shrubs with the AA		
Select the statement that best describes the utilization of trees and shrubs in the AA.	0-5% of the available second year and older stems are browsed OR woody species are naturally uncommon or absent.	1
	>5%-25% of the available second year and older stems are browsed.	2
	>25%-50% of the available second year and older stems are browsed.	3
	More than 50% of the available second year and older stems are browsed.	4

3. Physicochemical Metrics—Circle the applicable number.

PHYSICOCHEMICAL		
Soil Surface Integrity within the AA		
Select the statement that describes the soil surface integrity within the AA.	Soil disturbance is limited to naturally caused disturbances such as flood deposition or game trails.	1
	Soil disturbance due to human causes (including livestock) is present but minimal. Depth of disturbance is limited to a few inches and does not show evidence of ponding or channeling water. Site will recover within a few years after disturbance removal.	2
	Soil disturbance due to human causes is common and will be slow to recover. Damage is not excessive and the site will recover with the removal of degrading human influences and moderate recovery times.	3
	Soil disturbance is widespread and substantially degrades the site. Water, if present, would be channeled or ponded. The site will not recover without restoration and/or long recovery times.	4

Water Quality: Select the statements that best describe the following water quality indicators within the AA. If there is no water in the AA, then leave these metrics blank.		
Algae	No visual evidence of degraded water quality. No potential source of water quality degradation observed. Water is clear with minimal algae growth.	1
	Some negative water quality indicators are present and/or some potential sources of water quality degradation observed. Algae are limited to small and localized areas within the wetland. Water may have a minimal greenish tint, cloudiness, or sheen.	2
	Algal growth occurs in large patches throughout the AA. Potential sources of water quality degradation are apparent. Water may have a moderate greenish tint or sheen.	3
	Algal mats may be extensive, blocking light to the bottom. Potential sources of water quality degradation are apparent. Water has strong greenish tint, sheen, or turbidity. The bottom is difficult to see during the growing season.	4
Turbidity	No visual evidence of degraded water quality. No potential source of water quality degradation observed.	1
	Water is slightly cloudy and/or some potential sources of water quality degradation observed, but there is no obvious source of sedimentation	2
	Water is cloudy, but the bottom is still visible. Potential sources of water quality degradation are apparent.	3
	Water is milky and/or muddy. The bottom is no longer visible. Potential sources of water quality degradation are apparent.	4
Sheen (petroleum-based) Note: Sheens can be caused by bacteria. When disturbed, a bacterial sheen will break up into small platelets; petroleum sheens will quickly reform.	No visual evidence of degraded water quality. No potential source of water quality degradation observed. Water is clear with no sheen.	1
	Some negative water quality indicators are present and/or some potential sources of water quality degradation observed. Sheen on the water is limited to small and localized areas within the AA.	2
	Sheen occurs in large patches throughout the surface water of the AA. Potential sources of water quality degradation are apparent. Water may have a moderate sheen.	3
	Sheen is extensive throughout the surface of the water in the AA. Potential sources of water quality degradation are apparent. Water has a strong sheen.	4

4. Hydrologic Metrics—Circle the applicable number.

HYDROLOGY		
Water Inputs into the AA		
Select the statement that best describes the water sources into the AA during the growing season.	Sources are precipitation, groundwater, and/or natural runoff, or natural flow from an adjacent freshwater body, or the AA naturally lacks water in the growing season.	①
	Sources are mostly natural but can include occasional or small effects of modified hydrology. No large point sources or dams control the overall hydrology.	2
	Sources are primarily from anthropogenic sources (e.g., urban runoff, pumped water, impoundments, regulated releases through a dam).	3
	Natural sources have been eliminated based on the following indicators: impoundment of all possible wet season inflows, diversions of all dry-season inflows, predominance of xeric vegetation, etc.	4
Rank major water sources observed in the AA, or observed to potentially impact the AA, starting with 1 being the most dominant through 3. Mark all others present with a 4 and those not present as NA.	Natural Sources:	Count of Discrete Inlets:
	Overbank flooding	Channels
	Alluvial storage/hyporheic flow	Spring
	Throughflow	Ditches
	Groundwater discharge	Culvert
	Precipitation 2	Pipes
	Snowmelt 3	Pumps
	Anthropogenic Sources:	Other/Comments:
	Irrigation run-off/ditches	
	Urban run-off	
	Pipes directly feeding into wetland	
	Culvert	
Pumps		
Other:		
Water Outlet of the AA		
Select the statement that best describes the water outlet of the AA during the growing season. <i>Pipe for livestock well</i>	Water leaves the site through natural runoff, natural flow, evaporation, or outlet is blocked by natural features (e.g., beaver dam), OR the site naturally lacks water in the growing season.	1
	Outflow is mostly natural, but there is some modification due to anthropogenic restrictions (e.g., filling or development, channelization).	②
	Withdrawals are primarily from anthropogenic sources, and outflow has been significantly altered by flow obstructions (culverts, paved stream crossings, impoundments, ditching).	3
	Natural outflow has been completely eliminated due to the following indicators: dike/levees, railroads, or roads with no culverts.	4
Rank major water outlets observed in the AA, or observed to potentially impact the AA, starting with 1 being the most dominant through 3. Mark all others present with a 4 and those not present as NA.	Natural Sources:	Count of Discrete Outlets:
	Channelized flow (headwater wetland)	Channels
	Recharge to adjacent stream 3	Culvert
	Throughflow	Ditches
	Non-channelized flow to contiguous wetland area 2	Pumps
	No natural outlet	Other/Comments:
	Anthropogenic Sources:	
	Culverts under roadways / trails	
	Ditches established to drain wetland	
	Natural outlet blocked/bermed	
	Water is being pumped out of wetland	
	Other:	

Hydroperiod of the AA (for depressional, lacustrine, and slope wetlands--NOT fens)		
Select the statement that best describes the hydroperiod of the AA.	Hydroperiod of the AA is characterized by natural patterns of filling or inundation and drying or drawdowns.	1
	The filling or inundation patterns in the AA are of greater magnitude or duration than would be expected under natural conditions, but thereafter the AA is subject to natural drawdown or drying.	2
	Hydroperiod of the AA is characterized by natural patterns of filling or inundation, but thereafter, is subject to more rapid or extreme drawdown or drying, as compared to more natural wetlands. OR the filling or inundation patterns in the AA are of substantially lower magnitude or duration than would be expected under natural conditions, but thereafter, the AA is subject to natural drawdown or drying.	3
	Both the inundation and drawdown of the AA deviate from natural conditions (either increased or decreased in magnitude and/or duration).	4
Hydroperiod of the AA (for fens)		
Select the statement that best describes the hydroperiod of the AA.	Hydroperiod of the AA is characterized by stable, saturated hydrology, or by naturally damped cycles of saturation and partial drying.	1
	Hydroperiod of the AA experiences minor altered inflows or drawdown/drying, as compared to more natural wetlands (e.g., ditching).	2
	Hydroperiod of the AA is somewhat altered by greater increased inflow from runoff, or experiences moderate drawdown or drying, as compared to more natural wetlands (e.g., ditching).	3
	Hydroperiod of the AA is greatly altered by increased inflow from runoff or experiences large drawdown or drying, as compared to more natural wetlands (e.g., ditching).	4
Surface Water Connectivity of the AA (for depressional, lacustrine, and slope wetlands--NOT isolated fens)		
Select the statement that best describes the surface water connectivity of the site.	Water, when present, has unrestricted access into or out of the wetland. There are no artificial obstructions to surface water flow.	1
	Artificial obstructions limit the access of surface water into or out of the wetland, but the limitations exist for < 50% of the AA perimeter.	2
	Artificial obstructions limit the access of surface water into or out of the wetland for 50-90% of the AA perimeter. Flood flows may exceed the obstructions, but drainage into or out of the AA is probably obstructed.	3
	Artificial obstructions limit the access of surface water into or out of the wetland for >90% of the AA perimeter.	4
Surface Water Connectivity of the AA (for naturally isolated fens)		
Select the statement that best describes the surface water connectivity of the site.	No natural surface water connectivity with surrounding water bodies.	1
	Partial surface water connectivity with surrounding water bodies exists via artificial means (e.g., ditching or draining to dry the fen).	2
	Substantial to full surface water connectivity exists via artificial means that has obvious drying effects on the peat body.	3

Site ID McRee 02

Onsite and Surrounding Disturbances—Indicate the Scope and Impact of disturbances (see tables on p. 14).

Disturbances Observed <i>and</i> Expected to Impact the Site	Scope		Impact		Field Indicator Observed
	200 m	AA	200 m	AA	
Transportation Disturbances					
Paved surfaces (e.g., roads, parking lots)					
Unpaved roads	1	0	2	2	
Railroads					
Land Use Disturbances-Development or Recreation					
Domestic or commercial development					
Intensively managed sports fields, golf courses					
Recreation or human visitation					
Filling or dumping of sediment or fill					
Trash or refuse dumping					
Land Use Disturbances-Agriculture					
Dryland farming (e.g., wheat, barley, etc.)					
Open range livestock grazing	4	4	7	7	
Horse paddock					
Feedlot					
Irrigated cropland					
Irrigated hay pasture					
Irrigation ditches affecting wetland					
Permanent tree plantation					
Cropland treated with pesticides					
Disturbed fallow lands dominated by exotic species					
Haying of native grassland					
Fallow fields (no human use in past 10 years)					
Fields with recent plowing or discing					
Shelterbelts					
Fences that impede wildlife	1	0	1	1	
Land Use Disturbances-Resource Extraction					
Gravel pits, open pit mining					
Small scale mining activity or abandoned mines					
Abandoned oil/gas wells					
Oil/gas pump jacks (active)					
Injection wells, tank batteries, collection facilities, or other oil/gas-associated infrastructure					
Intensive logging (50-75% trees of >50 cm diameter removed)					
Selective logging (<50% of trees >50 cm diameter removed)					

Site ID Mr. Pae02

Disturbances Observed <u>and</u> Expected to Impact the Site	Scope		Impact		Field Indicator Observed
	200 m	AA	200 m	AA	
Land Use Disturbances-Vegetation Removal/Conversion					
Chemical vegetation control					
Evidence of intentional burning					
Mechanical vegetation removal					
Vegetation conversion (e.g., from shrubland to grassland)					
Natural or Environmental Disturbances					
Beetle-killed <i>Pinus</i> species					
Other diseased conifers					
Evidence of recent fire (<5 years)					
Beaver activity					
Evidence of prolonged drought					
Browsing of woody vegetation by native ungulates					
Hydrologic Disturbances					
Upstream spring box					
Impoundment of flowing water	0	1	2	2	livestock well that runs in well
Potential for agricultural runoff					
Potential for urban runoff					
Culvert					
Upstream dam					
Reservoir/stock pond					
Weir or drop structure					
Dredged inlet/outlet channel					
Engineered channel (e.g., riprap)					
Pumps, diversions, or ditches that move water <i>into</i> wetland					
Pumps, diversions, or ditches that move water <i>out of</i> wetland					
Berms/Dikes/Levees					

Scope and Impact Ratings

Scope of Disturbances	
5	Pervasive – Affects nearly all (>75%) of the envelope or AA.
4	Large – Affects most (>50-75%) of the envelope or AA.
3	Moderate – Affects much (>25-50%) of the envelope or AA.
2	Restricted – Affects some (>10-25%) of the envelope or AA.
1	Small – Affects a small (1-10%) portion of the envelope or AA.
0	Nil – Affects little to none (<1%) of the envelope or AA.
Impact of Disturbances	
4	Extreme – likely to extremely modify, degrade, destroy, or eliminate the wetland.
3	Serious – likely to seriously modify, degrade or reduce wetland function or condition.
2	Moderate – likely to moderately modify, degrade or reduce wetland function or condition.
1	Slight – likely to only slightly modify, degrade, or reduce wetland function or condition.

[illegible]

Site ID Wells

Montana Ecological Integrity Assessment Field Form 2015

ASSESSMENT AREA INFORMATION									
Site ID <u>Dick [Key] Wells</u>			Visit # <u>1</u>		Date <u>7/14/2015</u>				
Site Name <u>Wells Barren Oxbow</u>			Level 2 <u>X</u> Level 3 <u> </u>		Observer(s) <u>A. J. Janssen</u> <u>Clayton Mess</u> <u>Levin</u> <u>Point 2</u>				
Level 4 Ecoregion <u> </u>									
Land Ownership <u>Dick [Key] Wells</u>			Is this a mitigation wetland? <u>Y</u> <u>(N)</u>						
USGS Quad Name <u> </u>			Pre-construction Visit # <u> </u>						
HUC4/HUC5/HUC6 <u> </u>			Post-construction Visit # <u> </u>						
Slope 1 (°) <u>1</u>		Aspect 1 (°) <u>100</u>		AA is:					
Slope 2 (°) <u>1</u>		Aspect 2 (°) <u>290</u>		<u>X</u> Centered on original target coordinates					
				<u>X</u> Not centered on original target coordinates					
				<u> </u> Shifted but within 60 m of the original target coordinates					
GPS Coordinate Info				Dimensions of AA:					
Target AA Center Coordinates:		Longitude (X)		<u> </u> 40 m radius circle					
Latitude (Y)				<u> </u> Rectangle, width <u> </u> length <u> </u>					
GPS Unit Info. and Unit #: <u> </u>				<u>X</u> Other, describe below and take a GPS track					
Actual AA Center Coordinates:				Percent of AA that is upland (not wetland). THIS CANNOT BE MORE THAN 10% OF THE AA.					
Waypoint ID		Accuracy (m)		<u>5</u> fringes around wetlands					
Datum		Elevation (m)							
Latitude (Y)		Longitude (X)							
If AA is not a 40 m radius circle, record GPS coordinate information below:									
	Waypoint ID	Latitude (Y)	Longitude (X)	Accuracy (m)					
AA Corner #1									
AA Corner #2									
AA Corner #3									
AA Corner #4									
AA Track	Track Name:			Comments:					
General AA description, including surrounding uplands				Directions to AA and Access Comments:					
<u>Area is in the center of a small</u> <u>on creek - disturbed small</u> <u>basin of wetland is along creek</u> <u>about 1-2 ft from bank</u>									
Topographic Position (check one)			Amount of AA Covered by Standing Water (check one)			Estimated Depth of Standing Water (check one)			Surface Water Permanence (check one)
slope	floodplain	<u>X</u>	none	<u>X</u>	51-75%	< 0.5 m	<u>X</u>	1-2 m	Semipermanent
toeslope	valley bottom		1-25%		76-100%	0.5 - < 1 m		> 2 m	Seasonal
basin floor			26-50%						<u>X</u> Temporary
Assessment Area Photos-Taken from the center of the AA in the four cardinal directions									
Camera Information: <u>Label X</u>									
Photo #	<u>4564</u>	N	Description:						
Photo #	<u>4565</u>	E							
Photo #	<u>4566</u>	S							
Photo #	<u>4567</u>	W							
Site Overview Photo #	Aspect	<u>4571, 4570</u>							
Additional Photos:									

Site ID W113

CLASSIFICATION																							
Ecological System (check one--use Key to Ecological Systems): ☐ GP Prairie Pothole ☐ WGP Saline Depression ☐ WGP Open Depression ☐ WGP Closed Depression ☐ W. N. Am. Emergent Marsh ☒ NWGP Riparian/Floodplain ☐ Other ☐ RM Fen ☐ RM Wet Meadow ☐ LM Riparian Woodland and Shrubland ☐ RM Riparian Shrubland ☐ RM Riparian Woodland ☐ NRM Wooded Vernal Pool		Confidence Level: ☐ Very High ☒ High ☐ Low ☐ Medium ☐ Low Reason for selecting confidence level:																					
HGM Class (check one-use Key to Hydrogeomorphic Classes): ☐ Slope ☒ Depressional ☐ Flat ☐ Lacustrine Fringe ☐ Riverine (floodplain)* Specific classification and metrics apply to the Riverine HGM Class		Has the wetland been anthropogenically altered (impounded, diked, ditched, drained, etc.)? no																					
Confidence Level: ☐ Very High ☒ High ☐ Medium ☐ Low Reason for selecting confidence level: To High to flow every 2 years		Has this wetland been artificially created, enhanced, or restored? no																					
Cowardin Classification (check all that apply-use Key to Cowardin Systems):																							
Cowardin System ☐ Palustrine (P) ☐ Lacustrine Littoral (L2)		Cowardin Class ☐ Aquatic Bed (AB) ☐ Unconsolidated Bottom (UB) ☐ Unconsolidated Shore (US) ☐ Emergent (EM) ☐ Scrub-Shrub (SS) ☐ Aquatic Bed (AB) ☐ Unconsolidated Bottom (UB) ☐ Unconsolidated Shore (US)																					
Cowardin Water Regimes:																							
For L2UB, L2AB OR PAB, PUB ☐ Intermittently Exposed (G): surface water is present all year except in years of extreme drought ☐ Semipermanently Flooded (F): surface water persists throughout the growing season in most years; if surface water absent, water table at/near the surface ☐ Artificially Flooded (K): amount and duration of flooding completely controlled by artificial means (dikes, dams, pumps)		For PEM, PSS, PFO ☐ Semipermanently Flooded (F): surface water persists throughout the growing season in most years; if surface water absent, water table at/near the surface ☐ Seasonally Flooded (C): surface water is present early in the growing season, but absent by the end of the season in most years; if surface water absent, water table is often near the surface ☐ Saturated (B): saturated to the surface during the growing season; surface water seldom present ☐ Temporarily Flooded (A): surface water present for brief periods early in the growing season; water table lies well below the surface for most of the growing season; both upland and wetland plants present ☐ Intermittently Flooded (J): substrate usually exposed; flooded for variable periods without detectable seasonal periodicity; may have weeks, months, years between inundation periods. The sites are often saline/alkaline																					
For L2US, PUS ☐ Seasonally Flooded (C): surface water is present early in the growing season, but absent by the end of the season in most years; if surface water absent, water table is often near the surface ☐ Temporarily Flooded (A): surface water present for brief periods early in the growing season; water table lies well below the surface for most of the growing season; both upland and wetland plants present ☐ Intermittently Flooded (J): substrate usually exposed; flooded for variable periods without detectable seasonal periodicity; may have weeks, months, years between inundation periods. The sites are often saline/alkaline		Cowardin Special Modifiers ☐ Beaver (b) ☒ Excavated (x) ☐ Partially ditched/draind (d) ☐ Diked/impounded (h)																					
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">Cowardin Code</th> <th style="width: 30%;">% of AA</th> </tr> </thead> <tbody> <tr> <td>RPEM</td> <td>25</td> </tr> <tr> <td>RPIFO</td> <td>75</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table>		Cowardin Code	% of AA	RPEM	25	RPIFO	75					<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">Cowardin Code</th> <th style="width: 30%;">% of AA</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </tbody> </table>		Cowardin Code	% of AA								
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ASSESSMENT AREA DRAWING (add north arrow, document plant zones, indicate direction of drainage into or out of wetland, and include sketch of vegetation plot and soil pit placement). ALSO INDICATE ALL PLANT ZONES ON AERIAL PHOTO, IF POSSIBLE



Notes:

Site is located on an old channel of Riparian Creek. Soils indicate that area is not a wetland, but is a riparian area. Ash and boulder line the channel with moist understory.

Site ID Wells

Physical Patch Types	How many physical patch types occur within the site (refer to physical patch type table below)?	3
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List of Physical Patch Types within the Assessment Area

PHYSICAL PATCH TYPE	Present in AA	Percent Cover within AA	Description
Cover Classes 1: trace 2: <1% 3: 1-<2% 4: 2-<5% 5: 5-<10% 6: 10-<25% 7: 25-<50% 8: 50-<75% 9: 75-<95% 10: >95%			
Open water-pond or lake			Medium to large natural water body
Open water -pools			Areas that hold stagnant or slow moving water from groundwater discharge but are not associated with a defined channel.
Open water-river/stream	2	4	Areas of flowing water associated with a sizeable channel.
Open water-small rivulet			Areas of flowing water associated with a narrow stream channel.
Open water-oxbow/backwater channel	2	7	Areas holding stagnant or slow moving water that have been partially or completely disassociated from the primary river channel.
Open water-tributary/secondary channel			Areas of flowing water entering the main channel from a secondary source.
Open water-beaver pond			Areas that hold stagnant or slow moving water behind a beaver dam.
Active beaver dam			Debris damming a stream clearly constructed by beaver (note gnawed ends of branches)
Beaver canals			Canals cut through emergent vegetation by beaver.
Braided river channel			River channel consisting of a network of small channels separated by small and often temporary islands or bars.
Adjacent or onsite springs/seeps			Localized point of emerging groundwater, often on or at the base of a sloping hillside.
Debris jams/woody debris			Aggregated woody debris in a stream channel deposited by high flows.
Pool/riffle complex			Deep, slow-moving pools alternating with shallow, fast-moving riffles along the relatively straight course of a stream or river.
Point bars			A low ridge of sediment (sand or gravel) formed on the inner bank of a meandering stream.
Bank slumps or undercut banks in channel or along shoreline	2	4	A bank slump is the portion of a stream or other wetland bank that has broken free from the rest of the bank but has not eroded away. Undercut banks are areas along the bank or shoreline of a wetland that have been excavated by waves or flowing water.
Mudflats			An accumulation of mud at the edge of shallow waters, such as a lake or pond. Often intermittently flooded or exposed.
Salt flat/alkali flat			Dry open area of fine-grained sediment and accumulated salts. Often wet in the winter months or with heavy precipitation.
Animal mounds or burrows			Mounds or holes associated with animal foraging, denning, predation, or other behaviors.
Plant hummocks			A mound composed of plant material resulting in a raised pedestal of persistent roots or rhizomes.
Water tracks/hollows			Depressions between hummocks or mounds that remain permanently saturated or inundated with slow moving surface water.
Natural island			Naturally occurring islands surrounded by water. Island can be dominated by either wetland or upland vegetation.
Anthropogenic island			Island created by artificial means, often for nesting waterfowl.
Floating mat			Mats of peat held together by roots and rhizomes of sedges. Floating mats are underlain by water and /or very loose peat.
Marl/limonite beds			Marl is a calcium carbonate precipitate often found in calcareous fens. Limonite forms in iron-rich fens when iron precipitates from the groundwater incorporating organic matter.
Other:			

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4

Identify and describe the plant zones that occur within the assessment area. Identify the dominant plant species within each stratum. To be considered a separate plant zone, it must make up more than 5% of the AA (e.g., 250 m² for an AA of 0.5 ha).

Plant Zones in Entire Assessment Area

Height Scale for Each Plant Zone				Cover Scale for Each Plant Zone			
1	<0.5 m	6	10-15 m	1	Trace	6	10-<25%
2	0.5-1 m	7	15-20 m	2	<1%	7	25-<50%
3	1-2 m	8	20-35 m	3	1-<2%	8	50-<75%
4	2-5 m	9	35-50 m	4	2-<5%	9	75-<95%
5	5-10 m	10	>50 m	5	5-<10%	10	>95%

Stratum

(FO) Forest/Woodland (Trees/Shrubs > 5 m)	(V) Vines
(SH) Shrubland (Shrubs >0.5-5 m)	(SF) Submerged/Floating (Rooted or floating-exclude emergent)
(DS) Dwarf Shrubland (<0.5 m)	(SV) Sparsely Vegetated (including bare ground)
(H) Herbaceous (e.g., Graminoids, Forbs, Ferns)	(CW) Coarse Woody Debris (≥ 7.6 cm in diameter)
(NV) Nonvascular (Bryophytes, cryptogamic crusts)	(FW) Fine Woody Debris (≤ 7.5 cm in diameter)

Plant Zone #1 (Indicate location on site drawing)

Stratum	Dominant Species	Height Class	Cover Class	Comments
H	<i>Phalaris amurensis</i>	1	9	FACW
H	<i>Cirsium arvense</i>	1	6	FACU
H	<i>Carex</i> sp.	1	2	no inflorescence
H	<i>Schoenoplectus tabernaemontani</i>	1	2	OBL; found within 1-2 ft of water elevation
H	<i>Sisymbrium irio</i>	2	3	
H	<i>Schoenoplectus pungens</i>	1	2	OBL; found within 1-2 ft of water elevation
H	<i>Oenothera villosa</i>	2	2	FACU

Plant Zone #2 (Indicate location on site drawing)

Stratum	Dominant Species	Height Class	Cover Class	Comments
SH	<i>Ribes</i> sp.	1	3	sparsely, no inflorescence, berry not ripe
H	<i>Phalaris amurensis</i>	1	7	FACW
SH	<i>Symphoricarpos occidentalis</i>	1	4	UPL
FO	<i>Fraxinus pennsylvanica</i>	5	8	FAC
H	<i>Burnus nermis</i>	2	6	UPL
H	<i>Cirsium arvense</i>	1	6	FACU
FO	<i>Acer negundo</i>	5	6	FAC
	CWD		5	
H	<i>Arctium minus</i>	1	3	FACU
H	<i>Nepeta cataria</i>	1	2	FACU

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Plant Zone #3 (Indicate location on site drawing)				
Stratum	Dominant Species	Height Class	Cover Class	Comments

Plant Zone #4 (Indicate location on site drawing)				
Stratum	Dominant Species	Height Class	Cover Class	Comments

Plant Zone #5 (Indicate location on site drawing)				
Stratum	Dominant Species	Height Class	Cover Class	Comments

Percent of Each Plant Zone Within the AA		
Plant Zone	% of AA	Comments
1	25	
2	75	
3		
4		
5		

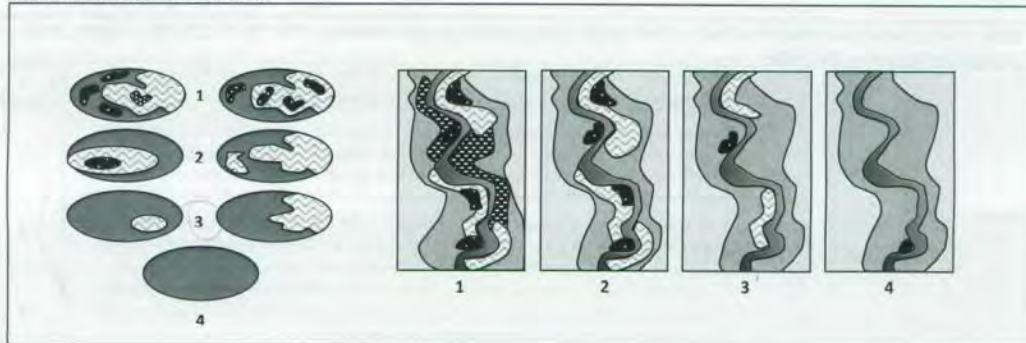
1. Landscape Context Metrics —Circle the applicable number

LANDSCAPE CONTEXT			
Landscape Connectivity within 200 m of the AA perimeter			
<i>For non-riverine wetlands, select the statement that best describes the landscape connectivity within a 200 m envelope around the AA perimeter (refer to site map).</i>	Intact: AA embedded in >90-100% unfragmented, natural landscape.	1	
	Variegated: AA embedded in >75-90% unfragmented, natural landscape.	2	
	Fragmented: AA embedded in >50-75% unfragmented, natural landscape.	(3)	
	Severely fragmented: AA embedded in 25-50% unfragmented, natural landscape.	4	
	Relictual: AA embedded in <25 % unfragmented, natural landscape.	5	
<i>For riverine wetlands, select the statement that best describes the landscape connectivity within a 200 m envelope upstream and downstream of the AA perimeter (refer to the site map).</i>	Intact: AA embedded in >90-100% unfragmented, natural landscape.	1	
	Variegated: AA embedded in >75-90% unfragmented, natural landscape.	2	
	Fragmented: AA embedded in >50-75% unfragmented, natural landscape.	3	
	Severely fragmented: AA embedded in 25-50% unfragmented, natural landscape.	4	
	Relictual: AA embedded in <25 % unfragmented, natural landscape.	5	
Buffer Length			
<i>Select the statement that best describes the buffer length around the AA perimeter.</i>	A buffer of at least 30 m occurs around 76-100% of the AA perimeter.	1	
	A buffer of at least 30 m occurs around 51-75% of the AA perimeter.	2	
	A buffer of at least 30 m occurs around 25-50% of the AA perimeter.	3	
	A buffer of at least 30 m occurs around <25% of the AA perimeter, OR NO BUFFER EXISTS.	(4)	
Buffer Width: Select the statement that best describes the buffer width of the AA. Estimate width up to 200 m from AA perimeter at eight evenly spaced intervals. Draw a 'pie' on your aerial photo and determine buffer width for each section.			
N <u>0</u>	S <u>0</u>	Average buffer width between edge of the AA and the edge of the buffer is >200 m.	1
NE <u>100</u>	SW <u>0</u>	Average buffer width between edge of AA and the edge of the buffer is >100-200 m.	2
E <u>30</u>	W <u>0</u>	Average buffer width between edge of the AA and the edge of the buffer is 50-100 m.	3
SE <u>0</u>	NW <u>75</u>	Average buffer width between edge of the AA and the edge of the buffer is <50 m, OR no buffer exists.	(4)
Average Buffer Width: <u>75</u>			
Buffer Condition within 200 m of the AA perimeter			
<i>Select the statement that best describes the plant species composition within a 200 m envelope around the AA perimeter.</i>	Abundant (>95%) native vegetation cover and little or no (<5%) cover of non-native plants.	1	
	Substantial (>75-95%) native vegetation cover and low (5-25%) cover of non-native plants.	2	
	Moderate (50-75%) native vegetation cover.	(3)	
	Low (<50%) cover of native vegetation, OR NO BUFFER EXISTS.	4	
<i>Select the statement that best describes the extent of soil disturbance composition within a 200 m envelope around the AA perimeter.</i>	Soils are intact.	1	
	Soils are slightly to moderately disturbed.	(2)	
	Soils are moderately to extensively disturbed.	3	
	Soils are highly disturbed OR ground is unnaturally bare, OR NO BUFFER EXISTS.	4	
<i>Select the statement that best describes the extent of trash or evidence of human visitation within 200 m of the AA perimeter.</i>	No trash present OR no evidence of human visitation or recreation.	1	
	Little trash OR evidence of minor human visitation or recreation.	2	
	Moderate or greater amounts of trash OR evidence of moderate human visitation/recreation.	3	
	Excessive amounts of trash OR evidence of high intensity human visitation/recreation, OR NO BUFFER EXISTS.	(4)	

2. Vegetation Metrics—Circle the applicable number

VEGETATION		
Relative cover of native plant species within the AA		
Select the statement that best describes the relative cover of native plant species within the AA.	>99% of the vegetation cover within the AA is comprised of native vegetation.	1
	95-99% of the vegetation cover within the AA is comprised of native vegetation.	2
	80-94% of the vegetation cover within the AA is comprised of native vegetation.	3
	50-80% of the vegetation cover within the AA is comprised of native vegetation.	4
	<50% of the vegetation cover within the AA is comprised of native vegetation.	5
Relative cover of listed noxious weed species within the AA (see State/County Noxious Weed list)		
Select the statement that best describes the relative cover of listed noxious weed species within the AA. Identify and rank the three most common noxious weed species observed in the AA. 1) <u>Ceanothus americanus</u> 2) _____ 3) _____	No noxious weed species are present in the AA.	1
	<1-3% of the vegetation cover within the AA is comprised of noxious weed species. If weeds occur in patches, then patches are small and isolated (1-2 patches) within the AA.	2
	>3-10% of the vegetation cover within the AA is comprised of noxious weed species. If weeds occur in patches, then patches are moderate in size and common (3-5 patches) within the AA.	3
	>10% of the vegetation cover within the AA is comprised of noxious weed species. If weeds occur in patches, then patches are relatively large and abundant (>5 patches) within the AA.	4
Relative cover of aggressive graminoids within the AA		
Select the statement that best describes the relative cover of aggressive graminoids within the AA. Identify and rank the three most common aggressive graminoids observed in the AA. 1) <u>Phalaris amabilis</u> 2) <u>Bromus inermis</u> 3) _____	No aggressive graminoid species are present in the AA.	1
	Aggressive graminoids are present in the AA, but with low cover (<10% relative cover of cattails or <5% cover of reed canarygrass, common reed, smooth brome, Kentucky bluegrass, common timothy, or meadow foxtail).	2
	Aggressive graminoids are common in the AA (10-25% relative cover of cattails or 5-10% relative cover of reed canarygrass, common reed, smooth brome, Kentucky bluegrass, common timothy, or meadow foxtail).	3
	Aggressive graminoids are abundant in the AA (>25-50% relative cover of cattails or 10-25% relative cover of reed canarygrass, common reed, smooth brome, Kentucky bluegrass, common timothy, or meadow foxtail).	4
	Aggressive graminoids are dominant in the AA (>50% relative cover of cattails or >25% relative cover of reed canarygrass, common reed, smooth brome, Kentucky bluegrass, common timothy, or meadow foxtail).	5
Herbaceous Litter/Woody Debris Accumulation within the AA		
Select the statement that best describes the herbaceous litter/woody debris accumulation of the site. Note: Site must have the potential to accumulate woody debris (i.e., woody plant species should be present at the site).	Site has moderate amount of fine litter/woody debris. New growth is more prevalent than previous years' growth. Layers of litter in pools or areas of topographic lows are thin.	1
	Site is characterized by small amounts of litter/woody debris, with little plant recruitment, OR litter/woody debris is somewhat excessive.	2
	Site has scant litter/woody debris OR litter/woody debris is excessive and is blocking plant recruitment.	3
Interspersion of Plant Zones within the AA		
Select the statement that best describes the patch interspersion of the site (use the associated schematics).	Horizontal structure consists of a very complex array of nested or interspersed irregular biotic patches with no single dominant type.	1
	Horizontal structure consists of a moderately complex array of nested or interspersed irregular biotic patches with no single dominant type.	2
	Horizontal structure consists of a simple array of nested or interspersed irregular biotic patches with no single dominant type.	3
	Horizontal structure consists of one dominant patch type with no interspersion.	4

Plant Zone Interspersion Schematic



Woody Species Establishment and Regeneration within the AA		
Select the statement that best describes woody species establishment and regeneration within the AA.	All age classes of native woody species present OR woody species are naturally uncommon or absent.	1
	Middle age group(s) absent. All other well-represented.	2
	Seedlings and saplings and middle age group(s) absent. The stand is comprised mainly of mature species.	3
	Woody species predominately consist of relict or dying individuals or AA has a > 5% canopy cover of Russian Olive and/or Salt Cedar.	4
Utilization of Trees and Shrubs with the AA		
Select the statement that best describes the utilization of trees and shrubs in the AA.	0-5% of the available second year and older stems are browsed OR woody species are naturally uncommon or absent.	1
	>5%-25% of the available second year and older stems are browsed.	2
	>25%-50% of the available second year and older stems are browsed.	3
	More than 50% of the available second year and older stems are browsed.	4

3. Physicochemical Metrics—Circle the applicable number.

PHYSICOCHEMICAL		
Soil Surface Integrity within the AA		
Select the statement that describes the soil surface integrity within the AA.	Soil disturbance is limited to naturally caused disturbances such as flood deposition or game trails.	1
	Soil disturbance due to human causes (including livestock) is present but minimal. Depth of disturbance is limited to a few inches and does not show evidence of ponding or channeling water. Site will recover within a few years after disturbance removal.	2
	Soil disturbance due to human causes is common and will be slow to recover. Damage is not excessive and the site will recover with the removal of degrading human influences and moderate recovery times.	3
	Soil disturbance is widespread and substantially degrades the site. Water, if present, would be channeled or ponded. The site will not recover without restoration and/or long recovery times.	4

Site ID hells

Water Quality: Select the statements that best describe the following water quality indicators within the AA. <i>If there is no water in the AA, then leave these metrics blank.</i>		
Algae	No visual evidence of degraded water quality. No potential source of water quality degradation observed. Water is clear with minimal algae growth.	<u>1</u>
	Some negative water quality indicators are present and/or some potential sources of water quality degradation observed. Algae are limited to small and localized areas within the wetland. Water may have a minimal greenish tint, cloudiness, or sheen.	2
	Algal growth occurs in large patches throughout the AA. Potential sources of water quality degradation are apparent. Water may have a moderate greenish tint or sheen.	3
	Algal mats may be extensive, blocking light to the bottom. Potential sources of water quality degradation are apparent. Water has strong greenish tint, sheen, or turbidity. The bottom is difficult to see during the growing season.	4
Turbidity	No visual evidence of degraded water quality. No potential source of water quality degradation observed.	1
	Water is slightly cloudy and/or some potential sources of water quality degradation observed, but there is no obvious source of sedimentation	2
	Water is cloudy, but the bottom is still visible. Potential sources of water quality degradation are apparent.	3
	Water is milky and/or muddy. The bottom is no longer visible. Potential sources of water quality degradation are apparent.	<u>4</u>
Sheen (petroleum-based) Note: Sheens can be caused by bacteria. When disturbed, a bacterial sheen will break up into small platelets; petroleum sheens will quickly reform.	No visual evidence of degraded water quality. No potential source of water quality degradation observed. Water is clear with no sheen.	<u>1</u>
	Some negative water quality indicators are present and/or some potential sources of water quality degradation observed. Sheen on the water is limited to small and localized areas within the AA.	2
	Sheen occurs in large patches throughout the surface water of the AA. Potential sources of water quality degradation are apparent. Water may have a moderate sheen.	3
	Sheen is extensive throughout the surface of the water in the AA. Potential sources of water quality degradation are apparent. Water has a strong sheen.	4

4. Hydrologic Metrics—Circle the applicable number.

HYDROLOGY		
Water Inputs into the AA		
Select the statement that best describes the water sources into the AA during the growing season. <i>check private land</i>	Sources are precipitation, groundwater, and/or natural runoff, or natural flow from an adjacent freshwater body, or the AA naturally lacks water in the growing season.	①
	Sources are mostly natural but can include occasional or small effects of modified hydrology. No large point sources or dams control the overall hydrology.	2
	Sources are primarily from anthropogenic sources (e.g., urban runoff, pumped water, impoundments, regulated releases through a dam).	3
	Natural sources have been eliminated based on the following indicators: impoundment of all possible wet season inflows, diversions of all dry-season inflows, predominance of xeric vegetation, etc.	4
Rank major water sources observed in the AA, or observed to potentially impact the AA, starting with 1 being the most dominant through 3. Mark all others present with a 4 and those not present as NA.	Natural Sources:	Count of Discrete Inlets:
	Overbank flooding <u>2</u>	Channels <u>1</u>
	Alluvial storage/hyporheic flow <u>4</u>	Spring
	Throughflow <u>1</u>	Ditches <u>1</u>
	Groundwater discharge <u>3</u>	Culvert
	Precipitation <u>1</u>	Pipes
	Snowmelt <u>4</u>	Pumps
	Anthropogenic Sources:	Other/Comments:
	Irrigation run-off/ditches	<i>only during high flow every day flows over</i>
	Urban run-off	
	Pipes directly feeding into wetland	
	Culvert	
Pumps		
Other:		
Water Outlet of the AA		
Select the statement that best describes the water outlet of the AA during the growing season.	Water leaves the site through natural runoff, natural flow, evaporation, or outlet is blocked by natural features (e.g., beaver dam), OR the site naturally lacks water in the growing season.	①
	Outflow is mostly natural, but there is some modification due to anthropogenic restrictions (e.g., filling or development, channelization).	2
	Withdrawals are primarily from anthropogenic sources, and outflow has been significantly altered by flow obstructions (culverts, paved stream crossings, impoundments, ditching).	3
	Natural outflow has been completely eliminated due to the following indicators: dike/levees, railroads, or roads with no culverts.	4
Rank major water outlets observed in the AA, or observed to potentially impact the AA, starting with 1 being the most dominant through 3. Mark all others present with a 4 and those not present as NA.	Natural Sources:	Count of Discrete Outlets:
	Channelized flow (headwater wetland)	Channels <u>1</u>
	Recharge to adjacent stream <u>1</u>	Culvert
	Throughflow <u>2</u>	Ditches
	Non-channelized flow to contiguous wetland area <u>2</u>	Pumps
	No natural outlet	Other/Comments:
	Anthropogenic Sources:	
	Culverts under roadways / trails	
	Ditches established to drain wetland	
	Natural outlet blocked/bermed	
	Water is being pumped out of wetland	
	Other:	

Hydroperiod of the AA (for depressional, lacustrine, and slope wetlands--NOT fens)		
Select the statement that best describes the hydroperiod of the AA.	Hydroperiod of the AA is characterized by natural patterns of filling or inundation and drying or drawdowns.	1
	The filling or inundation patterns in the AA are of greater magnitude or duration than would be expected under natural conditions, but thereafter the AA is subject to natural drawdown or drying.	2
	Hydroperiod of the AA is characterized by natural patterns of filling or inundation, but thereafter, is subject to more rapid or extreme drawdown or drying, as compared to more natural wetlands. OR the filling or inundation patterns in the AA are of substantially lower magnitude or duration than would be expected under natural conditions, but thereafter, the AA is subject to natural drawdown or drying.	3
	Both the inundation and drawdown of the AA deviate from natural conditions (either increased or decreased in magnitude and/or duration).	4
Hydroperiod of the AA (for fens)		
Select the statement that best describes the hydroperiod of the AA.	Hydroperiod of the AA is characterized by stable, saturated hydrology, or by naturally damped cycles of saturation and partial drying.	1
	Hydroperiod of the AA experiences minor altered inflows or drawdown/drying, as compared to more natural wetlands (e.g., ditching).	2
	Hydroperiod of the AA is somewhat altered by greater increased inflow from runoff, or experiences moderate drawdown or drying, as compared to more natural wetlands (e.g., ditching).	3
	Hydroperiod of the AA is greatly altered by increased inflow from runoff or experiences large drawdown or drying, as compared to more natural wetlands (e.g., ditching).	4
Surface Water Connectivity of the AA (for depressional, lacustrine, and slope wetlands--NOT isolated fens)		
Select the statement that best describes the surface water connectivity of the site.	Water, when present, has unrestricted access into or out of the wetland. There are no artificial obstructions to surface water flow.	1
	Artificial obstructions limit the access of surface water into or out of the wetland, but the limitations exist for < 50% of the AA perimeter.	2
	Artificial obstructions limit the access of surface water into or out of the wetland for 50--90% of the AA perimeter. Flood flows may exceed the obstructions, but drainage into or out of the AA is probably obstructed.	3
	Artificial obstructions limit the access of surface water into or out of the wetland for >90% of the AA perimeter.	4
Surface Water Connectivity of the AA (for naturally isolated fens)		
Select the statement that best describes the surface water connectivity of the site.	No natural surface water connectivity with surrounding water bodies.	1
	Partial surface water connectivity with surrounding water bodies exists via artificial means (e.g., ditching or draining to dry the fen).	2
	Substantial to full surface water connectivity exists via artificial means that has obvious drying effects on the peat body.	3

Onsite and Surrounding Disturbances—Indicate the Scope and Impact of disturbances (see tables on p. 14).

Disturbances Observed <u>and</u> Expected to Impact the Site	Scope		Impact		Field Indicator Observed
	200 m	AA	200 m	AA	
Transportation Disturbances					
Paved surfaces (e.g., roads, parking lots)					
X Unpaved roads	3	0	2	2	
Railroads					
Land Use Disturbances-Development or Recreation					
X Domestic or commercial development	1	0	1	1	low-rise houses/structures
Intensively managed sports fields, golf courses					
Recreation or human visitation					
Filling or dumping of sediment or fill					
Trash or refuse dumping					
Land Use Disturbances-Agriculture					
X Dryland farming (e.g., wheat, barley, etc.)	2	0	2	2	wheat or barley field to west of AA
X Open range livestock grazing	3	0	1	1	
X Horse paddock	1	0	1	1	
Feedlot					
Irrigated cropland					
X Irrigated hay pasture	2	9	2	2	
Irrigation ditches affecting wetland					
Permanent tree plantation					
Cropland treated with pesticides					
Disturbed fallow lands dominated by exotic species					
Haying of native grassland					
Fallow fields (no human use in past 10 years)					
Fields with recent plowing or disking					
Shelterbelts					
X Fences that impede wildlife	1	1	1	1	
Land Use Disturbances-Resource Extraction					
Gravel pits, open pit mining					
Small scale mining activity or abandoned mines					
Abandoned oil/gas wells					
Oil/gas pump jacks (active)					
Injection wells, tank batteries, collection facilities, or other oil/gas-associated infrastructure					
Intensive logging (50-75% trees of >50 cm diameter removed)					
Selective logging (<50% of trees >50 cm diameter removed)					

Site ID Wells

Disturbances Observed <u>and</u> Expected to Impact the Site	Scope		Impact		Field Indicator Observed
	200 m	AA	200 m	AA	
Land Use Disturbances-Vegetation Removal/Conversion					
Chemical vegetation control					
Evidence of intentional burning					
Mechanical vegetation removal					
Vegetation conversion (e.g., from shrubland to grassland)					
Natural or Environmental Disturbances					
Beetle-killed <i>Pinus</i> species					
Other diseased conifers					
Evidence of recent fire (<5 years)					
Beaver activity					
Evidence of prolonged drought					
Browsing of woody vegetation by native ungulates	2	2	1	1	
Hydrologic Disturbances					
Upstream spring box					
Impoundment of flowing water					
Potential for agricultural runoff					
Potential for urban runoff					
Culvert					
Upstream dam					
Reservoir/stock pond					
Weir or drop structure					
Dredged inlet/outlet channel					
Engineered channel (e.g., riprap)					
Pumps, diversions, or ditches that move water <i>into</i> wetland					
Pumps, diversions, or ditches that move water <i>out of</i> wetland					
Berms/Dikes/Levees					

Scope and Impact Ratings

Scope of Disturbances	
5	Pervasive – Affects nearly all (>75%) of the envelope or AA.
4	Large – Affects most (>50-75%) of the envelope or AA.
3	Moderate – Affects much (>25-50%) of the envelope or AA.
2	Restricted – Affects some (>10-25%) of the envelope or AA.
1	Small – Affects a small (1-10%) portion of the envelope or AA.
0	Nil – Affects little to none (<1%) of the envelope or AA.
Impact of Disturbances	
4	Extreme – likely to extremely modify, degrade, destroy, or eliminate the wetland.
3	Serious – likely to seriously modify, degrade or reduce wetland function or condition.
2	Moderate – likely to moderately modify, degrade or reduce wetland function or condition.
1	Slight – likely to only slightly modify, degrade, or reduce wetland function or condition.

Depth of Standing Surface Water (cm): 1
 Depth to Saturation (cm): 2
 Depth to free water in pit (cm) (NP=not present): 3

SOIL PROFILE DESCRIPTION

[illegible]

Depth of Standing Surface Water (cm): _____

Depth to free water in pit (cm) (NP=not present):

SOIL PROFILE DESCRIPTION

[illegible]

Soil Profile Photos

Photo #	45407
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Photo #

Photo #

Photo #

Photo #

1000

direct or indirect spin off

Redoximorphic features cannot form in soils with parent materials that are low in iron and manganese. To determine the soil matrix color, if soils are dry, wet sample until it no longer changes color. Always have the sun at your back when comparing to color chart to find best match.

Attachment 3. Ecological Integrity Assessment Scoring Protocols

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Ecological Integrity Assessment Scoring Protocols

Scores are calculated for each assessment attribute using metric narrative ratings and scoring formulas developed by MTNHP (Newlon et al. 2013). An overall site score is calculated in addition to the scores calculated for each major attribute.

Scoring formulas for Level 2 Attribute and Overall Wetland Condition Scores (from Appendix E; MTNHP 2013).

For each metric, convert narrative rating score (1, 2, 3, 4, and 5) into the corresponding metric score: 1=12, 2=9, 3=6, 4=3, and 5=1. If a metric has only four narrative ratings, then the metric scores are: 1=12, 2=9, 3=6, and 4=3. If metric has only three narrative ratings, then the metric scores are: 1=12, 2=6, and 3=1.

Each attribute score is calculated according to the following equations:

Landscape Context (LC) Attribute Score:

$$\text{Raw score} = [((\text{Buffer Condition_Plants} + \text{Buffer Condition_Soils} + \text{Buffer Condition_Trash})/3) \times (\text{Buffer width} \times \text{Buffer length})^{1/2}]^{1/2} + \text{Landscape Connectivity}$$

$$\text{Final Attribute score} = \frac{\text{Raw Landscape Context Score}}{\text{Total possible points allowed (24)}} \times 100$$

Vegetation Attribute Score:

$$\text{Raw score} = [((\text{Aggressive graminoids} + \text{Native} + \text{Noxious})/3) + \text{Litter or woody debris accumulation} + \text{Patch Interspersion} + ((\text{Woody vegetation}) + \text{Browse})/2]$$

$$\text{Final Attribute Score} = \frac{\text{Raw Vegetation Score}}{\text{Total possible points allowed (48)}} \times 100$$

Physicochemical (Physico) Attribute Score:

$$\text{Raw score} = [\text{Soil Surface Integrity} + ((\text{Water Quality_Algae} + \text{Water Quality_Plants} + \text{Water Quality_Turbidity})/3)]$$

$$\text{Final Attribute Score} = \frac{\text{Raw Physicochemical Score}}{\text{Total possible points allowed (24)}} \times 100$$

Hydrology (Hydro) Attribute Score:

$$\text{Raw score} = [(\text{Hydrologic Input} + \text{Hydrologic Output})/2] + \text{Hydroperiod} + \text{Surface Water Connectivity scores}$$

$$\text{Final Attribute Score} = \frac{\text{Raw Hydrology Score}}{\text{Total possible points allowed (36)}} \times 100$$

Final AA Score Calculation:

$$\text{Final AA Score} = (\text{Final LC} + \text{Final Vegetation} + \text{Final Physico} + \text{Final Hydro})/4$$

Attachment 4. Montana Wetland Assessment Method Data Forms

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MDT Montana Wetland Assessment Form (revised March 2008)

1. Project Name: Tongue River Palouse Corridor 2. MDT Project #: _____ Control #: _____
 3. Evaluation Date: Mo. 07 Day 15 Yr. 2008 4. Evaluator(s): K. Rantala 5. Wetlands/Site #(s): McRae
 6. Wetland Location(s): I. Legal: T _____ N or S; R _____ E or W; S _____; T _____ N or S; R _____ E or W; S _____;
 II. Approx. Stationing or Mileposts: _____
 III. Watershed: _____ Watershed Name, County: _____

7. a. Evaluating Agency: Team 8. Wetland size: (total acres) 1.14 (visually estimated) 660ft x 75ft
 b. Purpose of Evaluation: (measured, e.g. by GPS [if applies])
 1. _____ Wetlands potentially affected by MDT project
 2. _____ Mitigation wetlands; pre-construction
 3. _____ Mitigation wetlands; post-construction
 4. X Other Tongue River Palouse 9. Assessment area (AA): (acres, 1.14 (visually estimated)
 see instructions on determining AA) (measured, e.g. by GPS [if applies])

10. Classification of Wetland and Aquatic Habitats in AA

HGM Class (Brinson)	Class (Cowardin)	Modifier (Cowardin)	Water Regime	% of AA
<u>R</u>	<u>SS</u>	<u>-</u>	<u>C</u>	<u>15</u>
<u>R</u>	<u>SS</u>	<u>-</u>	<u>A</u>	<u>25</u>
<u>R</u>	<u>EM</u>	<u>-</u>	<u>C</u>	<u>10</u>

Abbreviations: (see manual for definitions)

HGM Classes: Riverine (R), Depressional (D), Slope (S), Mineral Soil Flats (MSF), Organic Soil Flats (OSF), Lacustrine Fringe (LF);

Cowardin Classes: Rock Bottom (RB), Unconsolidated bottom (UB), Aquatic Bed (AB), Unconsolidated Shore (US), Moss-lichen Wetland (ML), Emergent Wetland (EM), Scrub-Shrub Wetland (SS), Forested Wetland (FO)

Modifiers: Excavated (E), Impounded (I), Diked (D), Partly Drained (PD), Farmed (F), Artificial (A)

Water Regimes: Permanent / Perennial (PP), Seasonal / Intermittent (SI), Temporary / Ephemeral (TE)

11. Estimated relative abundance: (of similarly classified sites within the same Major Montana Watershed Basin, see definitions)

(Circle one) Unknown Rare Common Abundant

12. General condition of AA:

I. Disturbance: (use matrix below to determine [circle] appropriate response – see instructions for Montana-listed noxious weed and aquatic nuisance vegetation species (ANVS) lists)

Conditions within AA	Predominant conditions adjacent to (within 500 feet of) AA		
	Managed in predominantly natural state; is not grazed, hayed, logged, or otherwise converted; does not contain roads or buildings; and noxious weed or ANVS cover is ≤15%	Land not cultivated, but may be moderately grazed or hayed or selectively logged; or has been subject to minor clearing; contains few roads or buildings; noxious weed or ANVS cover is ≤30%.	Land cultivated or heavily grazed or logged; subject to substantial fill placement, grading, clearing, or hydrological alteration; high road or building density; or noxious weed or ANVS cover is >30%.
AA occurs and is managed in predominantly natural state; is not grazed, hayed, logged, or otherwise converted; does not contain roads or occupied buildings; and noxious weed or ANVS cover is ≤15%.	low disturbance	low disturbance	moderate disturbance
AA not cultivated, but may be moderately grazed or hayed or selectively logged; or has been subject to relatively minor clearing, fill placement, or hydrological alteration; contains few roads or buildings; noxious weed or ANVS cover is ≤30%.	moderate disturbance	<u>moderate disturbance</u>	high disturbance
AA cultivated or heavily grazed or logged; subject to relatively substantial fill placement, grading, clearing, or hydrological alteration; high road or building density; or noxious weed or ANVS cover is >30%.	high disturbance	high disturbance	high disturbance

Comments: (types of disturbance, intensity, season, etc.): grazing

II. Prominent noxious, aquatic nuisance, & other exotic vegetation species: Cirsium arvense, Phytolacca americana

III. Provide brief descriptive summary of AA and surrounding land use/habitat: land is predominantly ag / ranch on left bank on right bank but

13. Structural Diversity: (based on number of "Cowardin" vegetated classes present [do not include unvegetated classes], see #10 above)

Existing # of "Cowardin" Vegetated Classes in AA	Initial Rating	Is current management preventing (passive) existence of additional vegetated classes?		Modified Rating
≥3 (or 2 if 1 is forested) classes	H	NA	NA	NA
2 (or 1 if forested) classes	<u>M</u>	NA	NA	NA
1 class, but not a monoculture	M	←NO	YES→	L
1 class, monoculture (1 species comprises ≥90% of total cover)	L	NA	NA	NA

Comments:

SECTION PERTAINING TO FUNCTIONS & VALUES ASSESSMENT

14A. Habitat for Federally Listed or Proposed Threatened or Endangered Plants or Animals:

i. AA is Documented (D) or Suspected (S) to contain (circle one based on definitions contained in instructions):

Primary or critical habitat (list species)

D S

Secondary habitat (list species)

D S

Incidental habitat (list species)

D S

No usable habitat

S

Yellow-billed cuckoo - MTHP & FWS distribution maps

ii. **Rating** (use the conclusions from i above and the matrix below to arrive at [circle] the functional points and rating)

Highest Habitat Level	doc/primary	sus/primary	doc/secondary	sus/secondary	doc/incidental	sus/incidental	None
Functional Points and Rating	1H	.9H	.8M	.7M	.3L	<u>.1L</u>	0L

Sources for documented use (e.g. observations, records, etc):

14B. Habitat for plant or animals rated S1, S2, or S3 by the Montana Natural Heritage Program: (not including species listed in 14A above)

i. AA is Documented (D) or Suspected (S) to contain (circle one based on definitions contained in instructions):

Primary or critical habitat (list species)

D S

Secondary habitat (list species)

D S

Incidental habitat (list species)

D S

No usable habitat

S

several MTHP distribution maps, game trail? but single document by land owner

ii. **Rating** (use the conclusions from i above and the matrix below to arrive at [circle] the functional points and rating)

Highest Habitat Level	doc/primary	sus/primary	doc/secondary	sus/secondary	doc/incidental	sus/incidental	None
S1 Species:							
Functional Points and Rating	1H	.8H	<u>.7M</u>	.6M	.2L	.1L	0L
S2 and S3 Species:							
Functional Points and Rating	.9H	.7M	<u>.6M</u>	.5M	.2L	.1L	0L

Sources for documented use (e.g. observations, records, etc):

14C. General Wildlife Habitat Rating:

i. **Evidence of overall wildlife use in the AA** (circle substantial, moderate, or low based on supporting evidence):

Substantial (based on any of the following [check]):

- ☒ observations of abundant wildlife #s or high species diversity (during any period)
- ☒ abundant wildlife sign such as scat, tracks, nest structures, game trails, etc.
- ☐ presence of extremely limiting habitat features not available in the surrounding area
- ☐ interviews with local biologists with knowledge of the AA

Minimal (based on any of the following [check]):

- ☐ few or no wildlife observations during peak use periods
- ☐ little to no wildlife sign
- ☐ sparse adjacent upland food sources
- ☐ interviews with local biologists with knowledge of the AA

Moderate (based on any of the following [check]):

- ☐ observations of scattered wildlife groups or individuals or relatively few species during peak periods
- ☐ common occurrence of wildlife sign such as scat, tracks, nest structures, game trails, etc.
- ☐ adequate adjacent upland food sources
- ☐ interviews with local biologists with knowledge of the AA

ii. **Wildlife habitat features** (Working from top to bottom, circle appropriate AA attributes in matrix to arrive at rating. Structural diversity is from #13.

For class cover to be considered evenly distributed, the most and least prevalent **vegetated** classes must be within 20% of each other in terms of their percent composition of the AA (see #10). Abbreviations for surface water durations are as follows: P/P = permanent/perennial; S/I = seasonal/intermittent; T/E = temporary/ephemeral; and A = absent (see instructions for further definitions of these terms)

Structural diversity (see #13)	High								Moderate								Low			
	Even				Uneven				Even				Uneven				Even			
Class cover distribution (all vegetated classes)	P/P	S/I	T/E	A	P/P	S/I	T/E	A	P/P	S/I	T/E	A	P/P	S/I	T/E	A	P/P	S/I	T/E	A
Duration of surface water in ≥ 10% of AA	P/P	S/I	T/E	A	P/P	S/I	T/E	A	P/P	S/I	T/E	A	P/P	S/I	T/E	A	P/P	S/I	T/E	A
Low disturbance at AA (see #12i)	E	E	E	H	E	E	H	H	E	H	H	M	E	H	M	M	E	H	M	M
Moderate disturbance at AA (see #12i)	H	H	H	H	H	H	H	M	H	H	M	M	<u>H</u>	M	M	L	H	M	L	L
High disturbance at AA (see #12i)	M	M	M	L	M	M	L	L	M	M	L	L	M	L	L	L	L	L	L	L

iii. **Rating** (use the conclusions from i and ii above and the matrix below to arrive at [circle] the functional points and rating)

Evidence of wildlife use (i)	Wildlife habitat features rating (ii)			
	Exceptional	High	Moderate	Low
<u>Substantial</u>	1E	<u>.9H</u>	.8H	.7M
Moderate	.9H	.7M	.5M	.3L
Minimal	.6M	.4M	.2L	.1L

Comments:

14D. General Fish Habitat Rating: (Assess this function if the AA is used by fish or the existing situation is "correctable" such that the AA could be used by fish [i.e., fish use is precluded by perched culvert or other barrier, etc.]. If the AA is not used by fish, fish use is not restorable due to habitat constraints, or is not desired from a management perspective [such as fish entrapped in a canal], then circle **NA** here and proceed to 14E.)

Type of Fishery: Cold Water (CW) ☐ Warm Water (WW) ☒ Use the CW or WW guidelines in the user manual to complete the matrix

i. Habitat Quality and Known / Suspected Fish Species in AA (use matrix to arrive at [circle] the functional points and rating)

Duration of surface water in AA	Permanent / Perennial						Seasonal / Intermittent						Temporary / Ephemeral					
Aquatic hiding / resting / escape cover	Optimal		Adequate		Poor		Optimal		Adequate		Poor		Optimal		Adequate		Poor	
Thermal cover optimal / suboptimal	O	S	O	S	O	S	O	S	O	S	O	S	O	S	O	S	O	S
FWP Tier I fish species	1E	.9H	.8H	.7M	.6M	.5M	.9H	.8H	.7M	.6M	.5M	.4M	.7M	.6M	.5M	.4M	.3L	.3L
FWP Tier II or Native Game fish species	.9H	.8H	.7M	.6M	.5M	.5M	.8H	.7M	.6M	.5M	.4M	.4M	.6M	.5M	.4M	.3L	.2L	.2L
FWP Tier III or Introduced Game fish	.8H	.7M	.6M	.5M	.5M	.4M	.7M	.6M	.5M	.4M	.4M	.3L	.5M	.4M	.3L	.2L	.2L	.1L
FWP Non-Game Tier IV or No fish species	.5M	.5M	.5M	.4M	.4M	.3L	.4M	.4M	.4M	.3L	.3L	.2L	.2L	.2L	.2L	.1L	.1L	.1L

Sources used for identifying fish sp. potentially found in AA:

ii. **Modified Rating** (NOTE: Modified score cannot exceed 1 or be less than 0.1)

a) Is fish use of the AA significantly reduced by a culvert, dike, or other man-made structure or activity or is the waterbody included on the current final MDEQ list of waterbodies in need of TMDL development with listed "Probable Impaired Uses" including cold or warm water fishery or aquatic life support, or do aquatic nuisance plant or animal species (see Appendix E) occur in fish habitat? **Y** **N** If yes, reduce score in I above by 0.1:

b) Does the AA contain a documented spawning area or other critical habitat feature (i.e., sanctuary pool, upwelling area, etc.- specify in comments) for native fish or introduced game fish? **Y** **N** If yes, add 0.1 to the adjusted score in I or IIA above: **0.7**

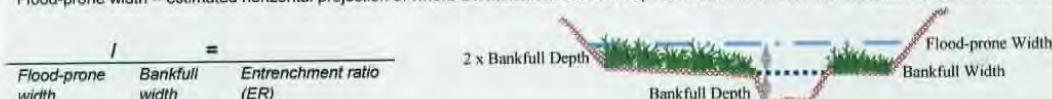
iii. **Final Score and Rating:** **0.7M** **Comments:**

14E. Flood Attenuation: (Applies only to wetlands subject to flooding via in-channel or overbank flow. If wetlands in AA are not flooded from in-channel or overbank flow, circle **NA** here and proceed to 14F.)

i. Rating (working from top to bottom, use the matrix below to arrive at [circle] the functional points and rating)

Estimated or Calculated Entrenchment (Rosgen 1994, 1996)	Slightly entrenched - C, D, E stream types			Moderately entrenched - B stream type			Entrenched - A, F, G stream types		
% of flooded wetland classified as forested and/or scrub/shrub	75%	25-75%	<25%	75%	25-75%	<25%	75%	25-75%	<25%
AA contains no outlet or restricted outlet	1H	.9H	.6M	.8H	.7M	.5M	.4M	.3L	.2L
AA contains unrestricted outlet	.9H	.8H	.5M	.7M	.6M	.4M	.3L	.2L	.1L

Entrenchment ratio (ER) estimation - see User's Manual for additional guidance. Entrenchment ratio = (flood-prone width)/(bankfull width)
Flood-prone width = estimated horizontal projection of where 2 x maximum bankfull depth elevation intersects the floodplain on each side of the stream.



Slightly Entrenched ER = >2.2			Moderately Entrenched ER = 1.41 - 2.2		Entrenched ER = 1.0 - 1.4		
C stream type	D stream type	E stream type	B stream type		A stream type	F stream type	G stream type

ii. Are ≥10 acres of wetland in the AA subject to flooding AND are man-made features which may be significantly damaged by floods located within 0.5 mile downstream of the AA (circle)? **Y** **N** **Comments:** AA is less than 10 acres in size

14F. Short and Long Term Surface Water Storage: (Applies to wetlands that flood or pond from overbank or in-channel flow, precipitation, upland surface flow, or groundwater flow. If no wetlands in the AA are subject to flooding or ponding, circle **NA** here and proceed to 14G.)

i. Rating (Working from top to bottom, use the matrix below to arrive at [circle] the functional points and rating. Abbreviations for surface water durations are as follows: P/P = permanent/perennial; S/I = seasonal/intermittent; and T/E = temporary/ephemeral [see instructions for further definitions of these terms].)

Estimated maximum acre feet of water contained in wetlands within the AA that are subject to periodic flooding or ponding	>5 acre feet			1.1 to 5 acre feet			≤1 acre foot		
Duration of surface water at wetlands within the AA	P/P	S/I	T/E	P/P	S/I	T/E	P/P	S/I	T/E
Wetlands in AA flood or pond ≥ 5 out of 10 years	1H	.9H	.8H	.8H	.6M	.5M	.4M	.3L	.2L
Wetlands in AA flood or pond < 5 out of 10 years	.9H	.8H	.7M	.7M	.5M	.4M	.3L	.2L	.1L

Comments: