South Fork Crab Creek Riparian and Wetland Enhancement

Environmental Assessment

DOI-BLM-OR-135-2015-0003-EA

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Bureau of Land Management
Border Field Office
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BLM
Spokane District Office

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1. Background

The Bureau of Land Management (BLM) is considering a proposal to enhance riparian and wetland conditions on BLM-administered lands in the lower South Fork of Crab Creek drainage in Lincoln County, Washington. BLM-administered lands on the South Fork of Crab Creek are located approximately twelve miles north of Ritzville, Washington in Lincoln County (Figure A-1). The legal description of the lower South Fork of Crab Creek area includes portions of township 21 N., Range 35 E., Section 23.

The project area considered for riparian and wetland enhancement includes approximately 50 acres of pasture within the boundaries of the Rocky Ford Allotment. The Rocky Ford Allotment is approximately 725 acres in size. The BLM authorizes livestock grazing on this allotment as a component of its multiple-use program under the Federal Lands Policy and Management Act of 1976 (FLPMA), and following Spokane District Resource Management Plan (RMP) direction and Federal Grazing Administration regulations (43 CFR 4100). The BLM manages land health and watershed function as directed by the RMP and Federal Grazing Administration regulations. A larger analysis area including the Rocky Ford Allotment and adjacent lands was also considered when relevant.

2. Compliance with Land Use Plans, Laws, Regulations, and Policy

The proposed action complies with the following land use plan, laws, and policy:

- National Environmental Policy Act (NEPA) (43 U.S.C. 4321-4347, 1970)
- Federal Water Pollution Control Act Amendments of 1972 (Clean Water Act) and major amendments
- Endangered Species Act (ESA; 7 U.S.C. § 136, 16 U.S.C. § 1531 et seq.1973) Sections 2 (c) and 7 (a) 1
- Federal Land Policy and Management Act (FLPMA) (43 U.S.C. 1701,1976)
- Public Rangelands Improvement Act (43 U.S.C. 1901, 1978)
- Spokane Resource Management Plan/Record of Decision/Rangeland Program Summary (May 1987)
- Spokane Resource Management Plan Amendment/Record of Decision (December 1992)
- The Record of Decision (ROD) for the Vegetation Treatments Using Herbicides Programmatic Environmental Impact Statement (PEIS) on BLM Lands in Seventeen Western States (September 2007)
- Section 106 of the National Historic Preservation Act (NHPA) of 1966 (36 CFR § 800.1(a)), as amended (2006).

BLM considered scientific and technical literature and professional experts when developing the proposed enhancement project, including Applied River Morphology (Rosgen 1996), WDFW Stream Habitat Restoration Guidelines (Cramer 2012), Integrated Streambank Protection

Guidelines (Cramer 2002), U.S. Geological Survey stream statistics (USGS 2015), and Ducks Unlimited (personal communications on record with BLM).

3. Purpose and Need and Decisions to be Made

The purpose of the South Fork Crab Creek Riparian and Wetland Enhancement project is to improve riparian and wetland conditions and improve aquatic habitat and water quality along the South Fork of Crab Creek.

This action is needed to meet direction in the Federal Land Policy and Management Act (FLPMA) and the Spokane District's Resource Management Plan (RMP). FLPMA directs the BLM to protect the quality of ecological, environmental, and water resources and provide food and habitat for fish, wildlife and domestic animals (43 U.S.C. 1701). The Spokane District's RMP identifies protection and enhancement of water quality as a Management Objective (RMP 1987 ROD, p. 12). Additionally, the RMP identifies restoration of natural functions and general habitat improvement as goals for riparian habitat areas, wetlands, and floodplains (RMP 1987 ROD, p. 19).

Using the analysis in this EA, the BLM will decide whether to:

- Implement riparian and wetland enhancement projects to improve habitat and water quality in the project area;
- Manage noxious weeds and invasive plant species in the project area;
- Modify a grazing lease to accomplish the above management objectives.

4. Scoping, Tribal Consultation, and Public Involvement

On May 27, 2014, the BLM posted a scoping letter on its public NEPA website describing the proposed action and purpose and need for action. No comments were received in response to the posting. Formal Section 106 consultation was initiated with the Tribal Chairs and Tribal Historic Preservation Officers of the Colville Confederated Tribes and the Spokane Tribe of Indians. Tribal consultation is described in Section 12: Tribes, Individuals, Organizations, or Agencies Consulted. BLM held informational meetings with the current allotment grazing lessee. Additionally, BLM shared information and received comments from an adjacent landowner. Comments received from all parties were considered during development of alternatives.

5. Issues Identified

The Interdisciplinary Team identified the following issues through public scoping, field review, and consideration of published and collected information regarding the project area and its surrounding landscape.

Issues are potentially associated with significant effects and helps the BLM determine the level of analysis needed to inform the decision-maker. Analysis of issues helps to facilitate a reasoned choice between alternatives. Indicators provided were used to describe the affected environment

for each issue, measure change in the issue for the different alternatives, and assess the impacts of alternatives.

Issue 1: Aquatic Resources

- How would actions designed to improve riparian conditions in South Fork Crab Creek, including in-water work, stream habitat modification, and fencing affect riparian and aquatic resources?
  Indicators: PFC (proper functioning condition), floodplain morphology, stream shading, water quality (dissolved oxygen (DO), pH, bacteria)

- How would actions designed to improve riparian conditions in South Fork Crab Creek affect riparian fauna using South Fork Crab Creek?
  Indicators: Fish usage and density

- How would actions designed to enhance wetlands in South Fork Crab Creek floodplain, including excavation, planting, and weed control affect wetland quality and quantity in the project area?
  Indicators: Wetland (lentic) categorical rating (Department of Ecology (DOE) class) (Hruby 2004), lentic PFC, and wetland fills (cubic yards (CY)).

Issue 2: Soils

- How would construction actions associated with the proposed action, including streambank enhancement and wetland excavation, affect soil resources?
  Indicators: Soil profile, soil exposure and loss (acres), and soil compaction (acres).

Issue 3: Wildlife

- How would noise and activity from wetland and riparian construction activities affect BLM Sensitive species, migratory birds, amphibians, and big game in the analysis area?
  Indicators: Acres of wildlife habitat impacted by noise and activity disturbance and duration of noise disturbance (weeks/days).

- How would habitat change from wetland and riparian enhancement affect BLM Sensitive species, migratory birds, amphibians, and big game in the analysis area?
  Indicators: Acres of wildlife habitat enhanced and change in number of waterfowl broods in project area.

Issue 4: Livestock grazing

- How would implementation of riparian fencing and wetland enhancement with grazing restrictions affect livestock grazing lease and lessee?

- How would stream and wetland enhancement actions affect livestock distribution, utilization and travel patterns.
  Indicators: Reduction in Available Forage (AUMs) and livestock distribution.

Issue 5: Noxious Weeds and Invasive Plants

- How would construction activities affect the spread and establishment of noxious weeds and invasive species?
- How would implementation of restoration measures affect the spread and establishment of noxious weeds and invasive species?

  Indicators: Presence of noxious weeds and invasive plants and acres of surface disturbance during germination and growth periods.

Issue 6: Vegetation

- How would equipment access and staging, excavating soil, installation of rocks, geotextile fabric/weed mat, plants, and fencing, and seeding of exposed soils with native grass and forb species affect vegetation in the project area?

  Indicators: Acres of native plant habitat removed and total acres of disturbance.

6. Resources and Resource Issues eliminated from further analysis

Resources that were considered in this EA are listed in Table 1. Resources not present in the project area or not impacted were eliminated from further analysis.

Table 1: Resources Considered in the Impact Analysis

Resource	Not Present	Present Not Impacted	Present Impacted	Rationale
Access		X		The proposed action would not result in changes in access to the area.
Air Quality		X		The proposed action would produce emissions and particulate matter above ambient levels. The analysis area is not included in an air quality nonattainment area. The proposed action would not lead to exceedance of air quality standards, and would not lead to designation of a nonattainment area in the analysis area. The proposed action would result in less than 30 tons of carbon emission, based on scope and use of excavation equipment. This level is lower than that typically analyzed by federal agencies (USDI BLM 2008).
Areas of Critical Environmental Concern	X			The project area is not located within or near an ACEC.
Cultural Resource		X		Alternatives would avoid impacts to cultural resources through design features and onsite monitoring during project implementation. See below.
Economic and Social Values		X		The permitted number of AUMs for livestock grazing would not be changed.

Resource	Not Present	Present Not Impacted	Present Impacted	Rationale
Environmental Justice	X			There are no minority or low income populations residing in the project area. The nearest town is Ritzville (population less than 2,000) more than 10 miles from the project area. The proposed action would have no adverse impact to any minority or low income populations' health, economic interests, or quality of life.
Fisheries			X	Impacts are disclosed under Environmental Consequences.
Floodplains			X	Impacts are disclosed under Environmental Consequences.
Forest Resources	X			The project area does not contain forest resources.
Noxious Weeds and Invasive Plant Species			X	Impacts are disclosed under Environmental Consequences.
Mineral Resources	X			There are no mineral resources or claims in the project area.
Migratory Birds			X	Impacts are disclosed under Environmental Consequences.
Paleontological Resources	X			There are no known paleontological resources located in the project area.
Prime and Unique Farmlands		X		The soil map unit including the action area has a farmland classification of "prime farmland if irrigated" (NRCS 2015). Also, the Farmland Protection Policy Act regulates uses that would permanently convert farmland to nonagricultural use. No alternatives would permanently convert farmland to nonagricultural use.
Soil Resources			X	Impacts are disclosed under Environmental Consequences.
Threatened, Endangered, and Sensitive Plants	X			Habitat is present for *Silene spauldingii* and *Polemonium pectinatum*. Plant surveys were completed in June 2014. No TES plants were found and no further sites are expected. See "Botany/Vegetation" in Design Features.
Threatened, Endangered, and Sensitive Animals			X	Impacts are disclosed under Environmental Consequences.
Threatened, Endangered, and Sensitive Fish	X			There are no threatened, endangered, or sensitive fish species in the project area or in the mainstem of Crab Creek downstream of the project area.
Range Resources			X	Impacts are disclosed under Environmental Consequences.

Resource	Not Present	Present Not Impacted	Present Impacted	Rationale
Recreational Use		X		Recreational uses consist of hiking and hunting and would not be changed as a result of implementing the proposed action or alternative.
Vegetation			X	Impacts are disclosed under Environmental Consequences.
Visual Resources		X		The project area is inventoried as VRI class IV, accommodating major modification of the view shed. The proposed action would reduce weeds in upland areas and enhance riparian areas and wetlands with native species. No modification to existing visual character of the project area is predicted.
Wastes, Hazardous and Solid	X			There are no solid or hazardous wastes in the project area and none would be created during implementation of any alternative.
Water Quality (Surface and Ground)			X	Impacts are disclosed under Environmental Consequences.
Wetland and Riparian Zones			X	Impacts are disclosed under Environmental Consequences.
Wild and Scenic Rivers	X			There are no Wild and Scenic Rivers near the project area.
Wilderness	X			There are no wilderness areas or Wilderness Study Areas within or near the project area.
Wildlife Resources			X	Impacts are disclosed under Environmental Consequences.

Potential impacts to cultural resources were important in the identification of design features. Design features were incorporated into the proposed action. Inclusion of design features resulted in a modification of the proposed action and resulted in the resource not being impacted; as noted above, resources that are present, but not impacted are not addressed in the environmental consequences (Section 10).

Cultural Resources: Historic use of the project area is documented through General Land Office (GLO) records, cadastral survey notes and maps, patent records, U.S. Census records, genealogical data, and historic maps (USDI 1874 and USDI BLM 2015). Pre-contact (pre-1800) use of the area by Native Americans is evident through archaeological sites in the vicinity, and the general knowledge that major confluences – such as the south fork and main stem of Crab Creek - are known to be important to Native Americans and early pioneer settlers as well. Historic sites related to early settlement of the area are noted within the project area, and have the potential to reveal information about this era. Two sites in or adjacent to the project area– one prehistoric and one historic – have been recommended as potentially eligible for the National Register of Historic Places. Both the Colville Confederated Tribes and the Spokane Tribe of Indians have ancestral links to this area, and have been active in the consultation process.

All sites recorded as part of a recent 2014 cultural resources inventory would be protected from any ground-disturbing activities within the project area by incorporating design features (Section 8) in any action alternative. These design features would include flagging and avoidance and implementation monitoring. It was not possible to survey the wetlands proposed excavation areas due to thick grass and marshy conditions so an archaeologist would be on site to monitor the work, as there is the potential for subsurface archaeological materials in the project area. Design features include having an archaeologist on site during all phases of ground disturbance, lessening the potential for impacts.

7. Alternatives

7.1. Alternative 1: No Action Alternative

Under the no action alternative (Alternative 1), the BLM would not implement stream or wetland restoration work in the analysis area. Current uses and management practices including grazing would continue.

7.2. Alternative 2: Proposed Action

The Proposed Action (Alternative 2) would entail construction activities, including:

1. Installation of a hardened creek crossing to minimize cattle impacts on stream banks and water quality.
2. Bank terracing and planting of riparian trees and shrubs, to provide overbank floodplain area, restore native riparian vegetation, improve water quality, and improve riparian habitat in this reach of South Fork Crab Creek.
3. Enhancement of wetland areas in the South Fork Crab Creek floodplain, including introducing native vegetation and improving wildlife habitat conditions.
4. Movement of excavation spoils to two separate spoils areas.

Construction equipment would include an excavator, bulldozer, and off road dump truck. Equipment would be active for at least 3 weeks throughout construction phases. Specific implementation phases are detailed below.

<u>Temporary Creek Crossing and Permanent Hardened Creek Crossing</u>
BLM would install a permanent hardened creek crossing at a stable location on South Fork Crab Creek above its tributary junction with Crab Creek (Figure A-2). This would allow cattle access to water, while minimizing hoof shear and sediment delivery to the creek.

The BLM would install a temporary rock channel crossing at the location of the hardened creek crossing. Equipment would use this crossing to move material from the east side of South Fork Crab Creek to the west side. A temporary culvert would be installed to pass creek flows. Following wetland and riparian enhancement, this temporary crossing would become the hardened creek crossing, and the culvert and any excess rock would be removed.

The permanent hardened crossing would consist of two rock lifts, a 9-inch lower lift to key in the crossing, overlain by 3 inch gravel. Hardened crossing final dimensions would be approximately

150 feet wide by 30 feet of stream length (Figure A-2). The hardened crossing would be constructed perpendicular to the creek. Construction of this hardened crossing would require excavation of more than 150 cubic yards (CY) of soil; less than 50 cubic yards would be hydric soil. BLM would place spoils from excavation associated with this hardened crossing installation in one of two spoils area currently dominated by non-native upland vegetation (Figure A-5).

Riparian Bank Enhancement

BLM would enhance approximately 1,000 linear feet (500 feet along both banks) of South Fork Crab Creek, through: a) terracing of a historically-ditched stream reach; and b) planting of native vegetation on banks currently dominated by invasive non-native vegetation (Figure A-3). An additional 1,500 feet of BLM-administered South Fork Crab Creek stream length (both banks) would be enhanced immediately upstream of the bank enhancement area, by installation of native riparian woody poles (Figure A-1). Riparian enhancement would occur upstream of an existing bridge and would not interact with the footings for this structure. Sequentially, the BLM would enhance the South Fork Crab Creek riparian area by:

- Excavating approximately 2,600 cubic yards of soil to establish stream bank and terrace morphology more similar to naturally-formed streams of a similar watershed size. Soil was historically removed from the channel and placed on the bank forming berms in some areas. BLM would use a tracked excavator to remove the berms and a tracked dump truck to transport the soil to designated spoils areas (Figure A-5). Equipment would cross South Fork Crab Creek at the temporary creek crossing. A 15-foot wide floodplain would be established at the estimated bank full elevation on each bank side (40 feet total bankfull width), to increase flood storage, sediment detention and allow some re-establishment of natural channel morphology[1]. BLM would place the spoils in designated areas dominated by non-native upland vegetation (Figure A-5).
- Salvaging intact soils below the reed canarygrass root zone and later spreading these soils on finished bank grades, where feasible.
- Installing approximately 2,000 $yard^2$ of erosion control coir matting or similar product for slope protection along the newly-excavated banks as necessary.
- Applying weed treatments in spring and fall, where necessary, in excavated bank enhancement (1.25 acres) area to promote development of plantings. Herbicides would be applied with backpacks post- planting along the edge of weed mats to reduce competition from reed canarygrass (*Phalaris arundinacea*).
- Planting more than 20,000 ft^2 with native riparian tree and shrub plugs or poles in excavated areas. BLM would establish plantings in appropriate riparian microsites, determined at the time of planting based on relative soil moisture and elevation. Native riparian shrub and tree species may include: chokecherry (*Prunus virginiana*), wood's rose (*Rosa woodsii*), blue elderberry (*Sambucus nigra*), coyote willow (*Salix exigua*), red osier dogwood (*Cornus sericea*), black cottonwood (*Populus trichocarpa*), thin leaf alder (*Alnus incana*), water birch (*Betula papyifera*) or other native riparian species. BLM would plant trees and shrubs approximately 1 foot deep into 6-inch diameter auger holes

[1] South Fork Crab Creek has a watershed area more than 60 square miles and a bankfull width of 20 feet. Natural systems of this size have bankfull widths more than 40 feet wide; excavated bankfull width would be approximately 40 feet. (Rosgen 1996, p. 74).

through the installed coir mat if necessary. Native riparian-wetland seed and plug materials (e.g., Nebraska sedge) could also be used in appropriate locations. The selection of native species will depend on the availability and feasibility when plants are needed.

- Trenching rows of willow poles and stakes on the newly excavated banks to increase bank roughness and minimize erosion during overbank flows (Figure A-6). Trenches would be less than 2 feet wide, would be placed roughly perpendicular to stream flow with a slight downstream angle, would occur every 100 feet of excavated bank length, and would be offset on opposite banks. Trenches would be planted with willow poles and whips, and backfilled with native material.
- Constructing approximately 1,600 linear feet of fencing to establish a 1.25-acre exclosure (less than 600 feet x 200 feet) to protect riparian planting from grazing. Fence would be constructed on both sides of the creek. Fencing would be composed of 4-strand, barbed, or smooth wire. Fencing would be a minimum of 16 inches above ground elevation, with bottom wires smooth to facilitate deer passage. Fencing would remain in place until stream banks were stable, and at least 75% of riparian plantings were established for at least three growing seasons and tall enough to escape browsing. Minor site maintenance would occur as necessary to facilitate the success of plantings during the first year of establishment. This maintenance could include weeding, plant protection, and supplemental watering.
- Installing native riparian woody poles (larger cuttings) and container stock on the existing bank areas along South Fork Crab Creek for approximately 1,500 feet of stream length upstream of the bank excavation. Native riparian woody poles would include willow species, red osier dogwood, or other species appropriate for the site soils and hydrology.

<u>Wetland enhancement</u>

BLM would enhance two wetland areas in the broad floodplain of South Fork Crab Creek (Figure A-4). BLM would employ techniques that have been successful in creating and enhancing wetland conditions on nearby BLM-administered lands (Bonsignore et al. 2013). Based on topographic survey data, much of this floodplain may have been wetland-dominated, prior to ditching of South Fork Crab Creek. Currently, wetland enhancement areas are dominated by the invasive wetland species, reed canarygrass. The objective of wetland enhancement would be to increase wetland native species, improve structural diversity, and enhance wetland soil conditions. BLM selected wetland enhancement areas to target the largest patches of reed canarygrass, while avoiding native wetland vegetation to the extent possible. Sequentially, the BLM would create or enhance wetlands in the lower South Fork Crab Creek floodplain by:

- Excavating approximately 13,000 cubic yards of topsoil. Approximately 3 acres of wetland would be enhanced (Figure A-4). Finished wetland base elevations would be set 6 inches to 1 foot above average growing-season subsurface flow, based on piezometer data collected beginning in 2012. This would produce palustrine wetland conditions (see glossary) during typical growing seasons. Open water conditions would occur during yearly high water events. Excavations would have 4:1 sideslopes, facilitating a range in wetland species tolerance to inundation. BLM would place spoils from excavation

associated with wetland enhancement in two designated areas of primarily non-native upland vegetation (Figure A-5).

- Salvaging intact soils below the reed canarygrass root zone and later spreading these soils on finished bank grades, where feasible.
- Planting excavated wetland areas with native shrub poles and container stock such as coyote willow, red osier dogwood, or other native hardwoods. Plantings would be protected from reed canarygrass competition using weed mats and wire or cattle panel cages.
- Seeding excavated wetland areas with a native wetland seed mix including tufted hairgrass (*Deschampsia caespitosa*), meadow barley (*Hordeum brachyatherum*), western mannagrass (*Glyceria occidentalis*), and other native species.
- Applying weed treatments in the project area during spring and fall as necessary to minimize invasion by adjacent noxious weeds and to promote development of plantings. BLM would apply herbicides post-excavation and pre-planting.
- Temporarily excluding cattle grazing from the area to allow establishment of native wetland vegetation (see Design Features).

<u>Spoil areas</u>
BLM would dispose of excavation spoils associated with the proposed action in the project area, above the floodplain of South Fork Crab Creek and outside of any wetlands or sensitive resources. Areas selected for spoil deposition are upland (Figure A-5), and include cover by primarily non-native upland vegetation. BLM would deal with excavation spoils by:

- Placing spoils from excavation associated with the hardened crossing, bank enhancement, and wetland enhancement in two designated areas of primarily non-native upland vegetation (Figure A-5). Estimated size of the area affected by spoils would be approximately 2.7 acres total. BLM would place all spoil material (approximately 17,000 cubic yard) in these two areas. BLM construction would increase spoil area elevations by a maximum of 3 feet. BLM would blend spoils to match natural topography; side slopes would be 3:1.
- Stabilizing spoil areas with weed free straw mulch, and seed with native shrub-steppe grasses.
- Applying weed treatments in spring and fall to spoils areas to minimize invasion of these areas by non-native species and promote development of native shrub-steppe plants. BLM would apply herbicide to excavation spoils: a) post-excavation and pre-seeding); and b) post-seeding if necessary.
- Seeding with various native shrub-steppe grasses including bluebunch wheatgrass (*Pseudoroegneria spicata*), as well as sterile grass hybrids.

8. Design Features

BLM would implement the following design features to minimize environmental impacts of the proposed action.

<u>In-water work</u>

- All work within the 2-year floodplain of identified waters of the state (U.S. Army Corps of Engineers), including South Fork Crab Creek, would be completed within a portion of the in-water work period approved by the Washington Department of Fish and Wildlife. In-water work for the South Fork Crab Creek would occur during dry, frozen, or low flow periods each year of construction.
- In-water work in flowing streams would be blocked off by nets in the work area prior to beginning any instream work. All fish in blocked areas would be removed by electro shocking and would be deposited downstream of nets prior to beginning work.
- Equipment used within 100 feet of aquatic areas would be fueled and serviced in an established staging area outside of riparian zones. When not in use, vehicles would be stored in a staging area outside of the 100-year floodplain.
- Crossing of South Fork Crab Creek would occur only at the hardened crossing area.

Equipment and staging

- Work off of road surfaces would use tracked vehicles to limit soil compaction.
- Staging areas would not be established within 50 feet of South Fork Crab Creek or Crab Creek. Staging areas would be established outside of areas containing cultural resources or wetlands.
- Staging areas (used for construction equipment storage, vehicle storage, fueling, servicing, hazardous material storage, etc.) would be established outside of the 100-year floodplain in a location and manner that would preclude erosion into or contamination of the stream or floodplain.
- All equipment used for instream work shall be cleaned and leaks repaired prior to entering the project area. Thereafter, any identified leaks would be addressed prior to entering streams or areas that drain directly to streams or wetlands.
- Upon project completion, project-related waste would be removed and properly disposed of.
- BLM would monitor spoil areas at the time of construction to avoid sensitive plants and minimize impacts to native vegetation.

Erosion control

- Sediment barriers would be installed prior to construction around sites where substantial levels of erosion may enter the stream directly or through road ditches. Barriers would be maintained throughout construction and site enhancement.
- All areas of ground disturbance within 75 feet of a stream channel would have short-term and permanent erosion control applied. Short-term stabilization measures may include the use of native seed, weed-free certified straw, jute matting, or other similar techniques. Stabilization measures would be instigated within 3 days of construction completion. Short-term stabilization measures would be maintained until permanent erosion control measures are effective.
- Seeding and mulching would be used prior to construction completion as necessary to stabilize soils.
- When necessary, compacted areas such as access roads, staging areas, and stockpile areas would be loosened (ripped) using construction equipment.

Spill Prevention Control and Containment Plan (SPCCP)

- Contractor would be required to have a written SPCCP which describes measures to prevent or reduce impacts from potential spills (fuel, hydraulic fluid, etc.). The SPCCP shall contain a description of the hazardous materials that would be used, including inventory, storage, handling procedures; a description of quick response containment supplies that would be available on the site (e.g., a silt fence, straw bales, and an oil-absorbing, floating boom whenever surface water is present).
- Included in the SPCCP would be the requirement for an Oil Spill Kit to be onsite during operations. The contents and use of the Spill Kit, which should be suitable for 50 gallons of petroleum containment consistent with heavy equipment operations, are to be detailed in any contract provisions.

Livestock Grazing

- Livestock would be excluded from the affected pasture for a minimum of two growing seasons to allow for establishment of seeded species in disturbed areas.

Wildlife

- Initial ground disturbing activities (heavy equipment excavations) would not occur during the migratory bird nesting season (April 15 – June 15).

Noxious Weeds and Invasive Plants

- The entire project area would be monitored for noxious weeds. A variety of noxious weeds and invasive plants including reed canarygrass (*Phalaris arundinacea*), cheatgrass (*Bromus tectorum*), knapweed (*Centaurea* spp.), Canada thistle (*Cirsium arvense*), rush skeletonweed (*Chondrilla juncea*), Dalmation toadflax (*Linaria dalmatica*), common mullien (*Verbascum thapsus*), and Russian olive (*Elaeagnus angustifolia*) occur in the project area.
- Noxious weeds and invasive plant species would be controlled with a combination of methods; including the use of chemical (herbicides), mechanical (mowing, hand-cutting and pulling), and biological (insects, fire and herbivory) methods.
- BLM would apply weed fabric/ weed mats in locations as appropriate to minimize invasion by noxious weeds and invasive plants during native plant establishment.
- Application methods for herbicides would include spraying from all-terrain vehicles (ATV), utility-terrain vehicles (UTV), or backpacks.
- Herbicide treatments would be implemented in accordance with the Record of Decision for Vegetation Treatments using Herbicides Programmatic Environmental Impact Statement (PEIS)(USDI BLM 2007), and any subsequent updates, revisions, or replacements.
- All herbicide applications would follow manufacturer's label instructions, specifications, and precautions; all federal, state and local laws, rules and regulations; and BLM policy. In instances where labels, federal, or state stipulations overlap, the more restrictive criteria would apply.
- Applications would be made by a certified applicator consistent with the manufacturer's label and BLM Pesticide Use Proposal (PUP).
- Herbicide applications would not be made if average wind speeds exceed 8 mph.
- No vehicle-mounted boom sprayers or handguns would be used within 25 feet of water.

- Herbicide applications would include the aquatic equivalents of Glyphosate and 2,4-D Amine for all treatments requiring an aquatic restriction.
- Vehicles (other than ATVs or UTVs) used in noxious weed control would be restricted to existing roads and trails. All vehicles operating throughout the project areas would be prohibited from operating within 10 feet of surface water (including streams, springs, seeps and wet soil areas).
- Precautions would be taken to prevent the introduction and spread of weeds caused by moving weed-infested sand, gravel, borrow, and fill material.
- All equipment working in project area would be free of weed seed and weed parts. To mitigate the introduction or spread of noxious and invasive plants all heavy equipment/machinery would be washed prior to entering BLM lands.
- Herbicides and application rates considered for the treatment of sites are shown in Table 2:

Table 2. Herbicides and Application Rates.

Herbicide	Maximum Rate (pounds active ingredient/acre)
Picloram	1.0
2,4-D Amine	1.9
Clopyralid	0.5
Chlorsulfuron	0.05
Triclopyr + Clopyralid	1.6
Glyphosate	7.0

Planting and Seeding

- Native grass seed or sterile hybrid grasses would be used for erosion control, applied in areas with exposed dirt. Grass species would be appropriate for the setting.
- All species to be planted and proposed seed mixes would be reviewed by BLM Botanist or BLM Restoration Specialist.

Botany/Vegetation

- If any changes to the proposed action occur during layout or after the completion of NEPA these changes would be reviewed by the botanist, and additional plant surveys would be conducted as necessary prior to project implementation. If Threatened, Endangered, or Sensitive plant species are discovered during project implementation site specific measures would be taken to maintain population viability.
- Effort would be made during wetland enhancement construction to avoid an existing row of Douglas hawthorn (*Crataegus douglasii*) trees.

Cultural

- All equipment used to excavate and transport materials would follow a predefined route that would avoid historic properties (sites, cultural resources) within the project area. Site locations are known to BLM and would be communicated to any contractors prior to performing the work and these would be identified with flagging (buffering the site

boundary). Equipment would not be permitted to enter these buffered zones unless authorized by the BLM archaeologist monitoring the work.

- All ground disturbing activities would be monitored by a BLM archaeologist.
- Inadvertent discoveries of cultural resources encountered during any phase of operations would result in cease of operations until a BLM archaeologist can assess the significance of the resource.

9. Monitoring

BLM would perform implementation and effectiveness monitoring during and following any construction. Implementation monitoring would determine whether the project was constructed as planned and analyzed; effectiveness monitoring would determine whether the project had the predicted effects on the environment.

Implementation monitoring would involve on-site reviews to ensure that project design features were implemented as described. BLM would conduct implementation monitoring specifically to ensure no cultural resources were impacted, as required for Section 106 compliance. Monitoring for protection of cultural resources would include on-site monitoring during all phases of work that involve ground disturbance.

BLM would perform effectiveness monitoring using existing monitoring tools including its proper functioning condition (PFC) methodology for aquatic habitat (Prichard 1998), and land health monitoring (Toevs et al. 2011) for terrestrial systems. Additional hydrological effectiveness monitoring (water levels through time) would be performed using existing water wells in the project area.

10. Affected Environment and Environmental Consequences

10.1. Issue 1: Aquatic Resources

Affected Environment

Stream (lotic) functional class (PFC): South Fork Crab Creek stream resources were classified as Functional-At Risk (FAR), using BLM lotic functional classification in manual TR 1737-15 (Dickard et al. 2013) (BLM data, on file). Key factors leading to this classification included: a) modification of sinuosity and loss of floodplain connection associated with channel dredging/ straightening; and b) lack of riparian diversity associated with reed canarygrass dominance.

Multiple indicator monitoring (MIM) (USDI BLM 2011) supported PFC classification results of a relatively stable but simplified system with some impacts. Approximately 6% of streambank areas in the project area are disturbed. Stubble height along the stream margin averages 64 inches and is dominated by reed canarygrass. Approximately 88% of streambank areas were stable during survey. Streambank areas were classified as very early seral, dominated by reed canarygrass with no woody species.

Stream shading: MIM results show 0% cover by woody species in the project area. No trees and no shrubs are present. Reed canarygrass and topographic conditions provide minimal shade in this reach.

Water quality: The Clean Water Act (administered by DOE) requires that all states restore their waters to be "fishable and swimmable." Washington's Water Quality Assessment lists the water quality status for water bodies in the state. The water quality assessment found that South Fork Crab Creek did not meet standards (total maximum daily loads (TMDLs)) for dissolved oxygen (DO), pH, and bacteria in DOE's 303(d) report (DOE 2012). Ongoing private land uses in the watershed and upstream of the project area including farming, livestock ranching, and development influence the water quality of South Fork Crab Creek.

Faunal usage: Fish sampling using electroshocking in spring 2013 did not reveal any fishes in South Fork Crab Creek. It is probable that fishes seek refuge in South Fork Crab Creek when the Crab Creek mainstem is in flood.

Wetland categorical rating (DOE class): DOE has developed methodology to categorize wetland function based on hydrologic function, habitat function, and provision of distinct ecological services (Hruby 2004). Classes include I (high value) through IV (low value). The wetland in the project area was classified as a Class III depressional wetland. This wetland had low scores for water quality, hydrologic function, and habitat function.

Wetland (lentic) functional class (PFC): PFC denotes how well wetland physical processes are functioning, and how resilient a wetland system is to disturbance (Prichard et al. 1998). Wetland resources in the project area were classed as PFC (BLM data, on file). These wetlands are hydrologically stable (supported by springs upslope) with no erosion, and vegetation (reed canarygrass) is stable. However, these wetlands are not meeting their full potential (see Glossary); they are not saturated near the surface in relatively frequent events, and they do not provide a diverse composition of riparian-wetland vegetation (Prichard et al. 2003).

Environmental Consequences

Alternative 1

The no action (Alternative 1) would maintain grazing at current levels in the Rocky Ford Allotment, and maintain the existing cattle access to South Fork Crab Creek. No riparian or wetland enhancement would occur. No fill of jurisdictional wetlands would occur under alternative 1.

Stream (lotic) functional class (PFC): Alternative 1 would maintain existing riparian and in stream conditions in South Fork Crab Creek. Grazing would continue to occur throughout the project area. Channel morphology would remain constrained, with no riparian shrub or tree overstory, and limited riparian herbaceous species diversity. Stream functional class would remain at FAR. Function would trend neither up nor down. This system has been in this state for many years.

Stream shading: Under Alternative 1, stream shading would remain low. The only shading would come from grasses and topographic relief (spoils piles on banks).

Water quality: Under Alternative 1, South Fork Crab Creek would continue to be 303(d) listed for pH, DO, and bacteria. Cattle directly accessing South Fork Crab Creek in the project area would contribute to these conditions.

Faunal usage: Fish would continue to be absent or rarely present in South Fork Crab creek under Alternative 1.

Wetland categorical rating (DOE class): Alternative 1 wetland classifications in the project area would remain Class III (low value). These systems would continue to provide some hydrologic function and limited habitat value.

Wetland (lentic) functional class (PFC): Wetlands in the project area under Alternative 1 would continue to be classified at PFC. These wetlands would remain stable, not growing in extent, but with limited structural or species diversity. Wetlands would not meet potential due to presence of invasive reed canarygrass and historic ditching.

Alternative 2

The proposed action would influence aquatic resources including South Fork Crab Creek's instream conditions, riparian area, and fauna using these resources.

Stream (lotic) functional class (PFC): Alternative 2 would enhance more than 0.5 acres and 1,000 linear feet of South Fork Crab Creek through removal of bank spoils, establishment of floodplain at the approximate 2-year floodplain elevation, planting of native riparian trees and shrubs, fencing to exclude cattle during tree and shrub establishment, and control of noxious weeds and invasive plant species. South Fork Crab Creek bank excavation would allow more natural channel meander in in the project area and widening of the riparian-wetland area, addressing several factors leading to its FAR classification. Planting of a riparian overstory would increase species and structural diversity in this reach of South Fork Crab Creek, addressing two factors leading to this FAR classification. Planting of native overstory would reduce reed canarygrass dominance (USFS 2105) and increase riparian species diversity. These modifications would be predicted to eventually change the reach in the project area to FAR with an upward trend; sediment from upstream and water quality issues would remain factors affecting stream function. Adjacent upstream reaches of South Fork Crab Creek would remain FAR.

Stream shading: The Proposed Action would increase stream shade by planting woody shrubs and trees along approximately 500 feet of South Fork Crab Creek's riparian area. An additional 1,000 linear feet would be planted with native woody poles. This planting would target a minimum of 25% woody species canopy cover in the treatment area.

Water quality: Construction of a hardened water crossing and riparian enhancement would temporarily increase sediment in South Fork Crab Creek. Due to low stream gradient and Design Features addressing erosion control and in-water work (Section 8), little sediment would

leave the project area and contribute to the mainstem of Crab Creek (downstream). Once construction sites were stabilized and plantings established, the project area would be expected to be a net sink for sediment.

South Fork Crab Creek is 303(d) listed for pH, DO, and bacteria. Minimization of cattle access to the bed and banks of South Fork Crab Creek would decrease one source of bacteria as well as nitrogen and phosphorous. This change at the downstream end of the creek would not change the 303(d) listing status of this stream reach.

Faunal usage: Alternative 2 would increase overstory shading and decrease sediment and nutrient loading in one reach of South Fork Crab Creek. It is unlikely that these changes would make this reach habitable by fishes, due to ongoing upstream water quality impacts.

Wetland fill: Excavation and installation of rock for a hardened crossing would impact less than 90 square feet of South Fork Crab Creek's riparian area supporting hydric soils, wetland hydrology, and some hydrophytic plants; this would represent less than 25 cubic yards of fill in potentially jurisdictional wetlands. Excavation for enhancement of wetland areas in the South Fork Crab creek valley would affect less than 3 acres, but would not remove these wetlands; instead, these wetlands would be enhanced (see below).

Wetland categorical rating (DOE class): Alternative 2 would include excavation to increase the range in elevations present in the project area wetlands, and seedings/plantings to increase the species and structural diversity in these wetlands. Alternative 2 would increase seasonal flood storage in the area, support some open water (with aquatic beds) during spring, and support a range of wetland plant species. This would change the enhanced wetland's DOE rating to II, an improved category.

Wetland (lentic) functional class (PFC): Under Alterative 2, the wetlands in the project area would continue to be classed as in PFC, but would move closer to their potential. Saturation near the surface would be increased, wetland extent would be increased, and diversity of wetland vegetation would be increased. This would improve the function of these wetlands, including their resiliency to overland flow events and support of desired values such as wildlife habitat (see Wildlife Section).

10.2. Issue 2: Soils

Affected Environment

Soils within the project area are classified as part of the Haploxeroll taxonomic great group; these are soils forming under grassland cover in xeric conditions (12 inches precipitation) with a minimum of 1% organic matter in their topsoils (USDA NRCS 1998). Moving from riparian to upland positions, the project area supports coarse-silty loams, stratified very cobbly loams, and coarse-loamy, aridic soils. The soil map unit encompassing most of the project area, including wetland and riparian enhancement areas, is an Esquatzel silt loam (USDA NRCS 2015). This soil consists of alluvium from loess. Soil depths are greater than 60 inches in the majority of the project area. This soil type is classified as not flooded and not meeting hydric criteria. BLM and

U.S. Army Corps of Engineers field review identified that spring and riparian conditions in the project area have modified conditions within the soil map unit in lower elevation portions of the project area. Soil inclusions in the action area may include wetter soils (e.g., Pedigo and Cocolalla soil map units) which would be classified as “Farmland of statewide importance". However, FPPA directs that farmland designations be based on support of greater than 50% of the map unit (USDA NRCS 2015b).

Soil profiles in the majority of the project area reflect historic flood dynamics and soil formation processes. Soil profiles have been disturbed in creek-side spoils areas. Soils have not been compacted, reflecting accretion and deposition, with low intensity grazing.

Soils are currently stabilized by non-native rhizomatous grass (reed canarygrass) and other grasses in the South Fork Crab Creek valley, and by shrub-steppe vegetation (with some weed species) in upland areas.

Environmental Consequences

Alternative 1

Under the No Action Alternative (Alternative 1), the soil formation and soil modification processes would continue. Grazing and recreation would occur at levels similar to current levels. Soils would remain in place, minimally compacted, relatively deep, and stabilized by non-native rhizomatous grass and shrub-steppe vegetation. Under Alternative 1, no soils would be dredged from or filled into the project area.

Alternative 2

Under the Proposed Action, the BLM or its designee would disturb soil resources in the project area associated with the following management activities:

- Installation of a hardened crossing, removing less than 150 cubic yards of non-hydric soils. Impacts to wetland soils are described above.
- Bank enhancement through excavation and removal of 2,600 cubic yards of upland soils, affecting approximately 1 acre.
- Construction vehicle access and movement. Approximately 30 acres would be exposed to these activities during project implementation.
- Placement of salvaged topsoils in enhanced wetland areas and enhanced riparian slopes.
- Sediment deposition from upstream areas into excavated wetland and riparian areas.
- Placement of excavated soils into two spoils areas totaling less than 3 acres in size.

Fill of wetlands through removal of or fill with soils are described above.

The amount of soil excavated during construction of Alternative 2 would be less than the soil lost from 500 acres of farmed land in one year. Excavated soils would be placed in spoils piles and little would be lost from the project area. Exposed soils produced during construction would represent less than 1% of this allotment. In excavation areas, soil depth would be reduced and soil profiles would be modified. Soil could be lost from excavated, disturbed areas through wind

or water erosion. However, enhancement actions would quickly cover this soil with matting and native plantings.

Construction vehicles could compact up to 30 acres in the project area. Loamy soils are susceptible to compaction, but soils with larger particle size (such as the cobbly loams in part of the project area) would be resistant to compaction (USDA NRCS 2001). Compaction would affect less than 5% of this allotment. Based on observations of similar construction, compaction would not limit the growth of plants in the project area. Plant action is predicted to reduce any compaction within 10 years following construction.

10.3. Issue 3: Wildlife

Affected Environment

Wildlife habitats in the project area consist of wet meadows dominated by exotic pasture grasses such as reed canarygrass and Kentucky bluegrass (*Poa pratensis*), streamside riparian vegetation along the South Fork Crab Creek, and adjacent shrub-steppe uplands. The few trees (Douglas hawthorn) that are present occur in association with the stream channel but are located about 200-300 feet upslope from the actual channel.

Adjacent habitats include more diverse and native wetlands to the south, which provide open water and emergent vegetation habitats consisting of cattails (*Typha sp.*), bulrush (*Scirpus sp.*), and Nebraska sedge (*Carex nebrascensis*). A main county road borders the east side of the project area, and a small group of non-native poplar trees associated with a spring exists alongside this road. The main stem of Crab Creek, an important wildlife corridor, runs east-west along the north side of the project area.

Wildlife species using the project area include mule deer, badger, coyote, raccoon, pocket gopher, meadow vole, various bats, Columbia spotted frogs, and a variety of migratory birds, waterfowl, and raptors. No federally-listed species have the potential to occur within or adjacent to the project area.

The project area lies within the Upper Crab Creek sage-grouse Priority Area for Conservation (PAC). Sage-grouse in this PAC are closely monitored using radio telemetry. One male has been documented within 10 miles of the project area near Odessa, but the majority of sage-grouse activity, including all breeding activity, is approximately 20 miles away in the Swanson Lakes/Twin Lakes area. Furthermore, sage-grouse habitat in the project area is limited due to the dominance of surrounding agricultural land and rugged topography of the stream corridor. Given the lack of sage-grouse presence and low habitat quality for recovery, this species will not be discussed further.

Three BLM Sensitive species have the possibility to occur (based on habitat and range): white-tailed jackrabbit, Townsend's big-eared bat, and pallid bat. No records for these exist in or nearby the project area, but no formal surveys for these species have been conducted. Jackrabbits require shrub-steppe with succulent vegetation (meadow edges). Townsend's big-

eared and pallid bats require roost sites (e.g. bridges, rock crevices, abandoned buildings) and riparian foraging habitat.

Migratory birds have not been completely inventoried in the project area, but observations during site visits have included mallard, American coot, northern harrier, red-winged blackbird, and black-billed magpie, which appear to be the dominant breeding birds in the project area. Several other species of waterfowl and waterbirds would be expected in this region; however the small size and lack of open and emergent water appear to be limiting factors for a more diverse waterfowl assemblage.

The only migratory birds on the U.S. Fish and Wildlife Service' list of Birds of Conservation Concern (BCC) that may be present (based on habitat and range) are those associated with shrub-steppe uplands (loggerhead shrike, Brewer's sparrow, sage sparrow, and sage thrasher), which surround the project area. No riparian-associated BCC birds are expected (based on range) to be present within the project area.

Environmental Consequences

Alternative 1

No riparian or wetland enhancement would occur. The effect of this alternative on wildlife would be to maintain the status quo. Wildlife habitats would continue to consist of a near monoculture of exotic pasture grasses. No additional wetlands or riparian shrub habitat would be created. Waterfowl, bat, and amphibian populations would continue to be limited by the lack of emergent wetland habitat. Migratory birds, winter waterfowl, and mule deer would not be temporarily displaced by noise and activity associated with construction activities.

Alternative 2

The effects of the proposed action on wildlife relate to 1) noise and activity at the time of construction, and 2) habitat change as a result of the wetland and riparian enhancement activities.

Noise and activity are known to disrupt behavior of diurnal wildlife such as mule deer and various species of songbirds and waterfowl. An excavator, bulldozer, and dump truck would be used for about 3 weeks throughout the construction phase of this project, which would occur outside the migratory bird nesting season (April 15 – June 15), therefore impacts would be limited to the non-breeding season. This equipment would produce about 85 decibels of noise at 50 feet while operating compared to ambient noise in rural settings typically being about 40 decibels. This type of construction noise typically affects birds and other wildlife within 0.25 miles of the source. Considering the topography of the project area, construction noise would affect approximately 50 acres of riparian and 100 acres of upland shrub-steppe habitat for approximately 3 weeks.

Using average densities of shrub-steppe obligate birds from other nearby BLM lands, we estimate approximately 12-36 BCC birds (Brewer's sparrow, sage sparrow, loggerhead shrike, and sage thrasher) would be affected by noise in the 100-acre upland shrub-steppe disturbance

area. These BCC birds would be temporarily displaced for about 3 weeks outside the breeding season while construction is ongoing.

Fall-migrating and wintering waterfowl associated with the 50 acres riparian disturbance area would also be displaced for about 3 weeks. This would primarily affect the handful of coots and mallards known to the project area as well as any Canada geese, tundra swans, great blue herons or other winter residents if they happen to move through the project area at the time of construction. No riparian associated BCC birds would be affected by noise because none are expected (based on range) to occur in the project area.

Mule deer would also be displaced by noise and activity for about 3 weeks during construction. In late summer and fall this would primarily affect does with fawns seeking mesic vegetation, which is a main limiting factor to mule deer populations. An unknown number of doe-fawn pairs would be displaced from the riparian area, but effects again are expected to last only 3 weeks and would result in mule deer moving to other adjacent mesic vegetation along the Crab Creek corridor.

Wildlife habitat change as a result of the excavation and improvement activities would have permanent and beneficial effects on wildlife. Approximately 3 acres of palustrine wetland and 500 feet of riparian habitat would be enhanced. Enhanced palustrine wetland would primarily benefit dabbling ducks such as mallards, which currently breed on adjacent wetlands, and may see their numbers increase by several pairs. Other dabbling ducks currently not present such as cinnamon teal, northern shoveler, and gadwall may begin to use the wetlands for breeding thus increasing overall breeding waterfowl diversity. Past wetland restoration projects in similar habitat types has shown that there are also 28 species of waterfowl and waterbirds that may use the wetland enhancements during migration. Of these, 21 species are considered “priority species” by the Intermountain West Joint Venture.

Other wildlife, such as Columbia spotted frogs, various bat species, and mule deer would also benefit from the creation of palustrine wetlands. Anecdotal data from bat surveys of other nearby wetland projects show an 8-fold increase in the number of bat calls after wetlands are enhanced. Columbia spotted frogs are highly aquatic, thus 3 additional acres of wetlands would provide for more egg-laying habitat and larger populations. Mule deer does and fawns would benefit from additional mesic vegetation that lasts longer into the summer since this is a limiting factor for mule deer populations.

The riparian plantings would establish woody vegetation on 500 feet of stream. Native woody pole plantings would influence an additional 1,000 linear feet of stream length. These plantings would primarily benefit riparian associated migratory birds such as warblers, kinglets, vireos, and flycatchers. Yellow-rumped warblers are known to nest in riparian plantings only a few years after establishment. Plantings would also benefit bats by supporting higher insect populations associated with woody shrubs. This would have the biggest benefit for pallid bats because they specialize in gleaning insects off shrubs.

10.4. Issue 4: Livestock Grazing

Affected Environment

The project area is located in the Rocky Ford Allotment #00652. The allotment contains approximately 730 acres of public land; consisting of two managed pastures, East and West of Rocky Ford county road. Both pastures are managed in a short duration, deferred (delayed until seed maturity of key forage species) grazing system. The East pasture is approximately 630 acres and is scheduled for late fall grazing. The West pasture is approximately 90 total acres, fenced east and west (60 acres south of Crab Creek and 30 acres north). The northern portion was excluded from grazing in 2001 to help restore and enhance riparian values along Crab Creek. Due to adequate forage provided in the southern area, the northern portion has remained unscheduled for grazing. The proposed enhancement project is located in the southern portion of the West pasture. Livestock graze the southern portion in late summer/early fall. The 2001 fence to exclude livestock from Crab Creek indirectly created a livestock crossing point on the South Fork Crab Creek; this is the crossing point that would be addressed as part of the proposed project.

There is dispersed livestock trailing along the upper benches of South Fork Crab Creek to an existing crossing point. The streambanks at the crossing point are tapered back and the stream substrate consists of rock/gravel. Trails on both sides of the creek suggest that cattle are traveling to this point to cross and drink water.

Livestock water is provided by Crab Creek in the East pasture and South Fork Crab Creek in the West pasture with supplemental water available from spring development. The Rocky Ford Allotment Management Plan (AMP), signed August 20, 2001, specifies that cattle grazing would occur annually in the West and East pastures. The allotment has a preference of 80 AUMs, and up to an additional 45 AUMs granted on a temporary non-renewable basis (at discretion of the BLM authorized officer). The East pasture has adequately addressed the preference AUMs (80) of the Rocky Ford Allotment with additional AUMs (36) authorized for the West pasture. The current grazing lease is as follows:

Table 3. Current Grazing Lease Authorization:

Pasture	Livestock		Grazing Period		%PL	Type Use	AUMs
	No.	Kind	Begin	End			
East	100	Cattle	11/01	11/24	100	Active	79 *(80)
West	100	Cattle	9/1	9/11	100	Active	36

*Preference AUMs; An AUM is the equivalent of forage consumed by one cow and one calf for one month. Current Lease: Base Property and BLM lease expire December 31, 2015.

Environmental Consequences

<u>Alternative 1</u>

The existing livestock grazing in the project area would not change. The grazing lease authorization would remain the same as current use; 80 preference AUMs with 36 temporary

non-renewable AUMs available for livestock grazing. Available forage would remain the same as under current conditions. Forage availability and production would remain the same.

Livestock distribution would also continue to reflect current conditions. Livestock do not currently concentrate or loaf along the immediate stream channel to access water or shade. Livestock would continue to trail along the upper bank of South Fork Crab Creek to cross and access water. There would be no fence requiring annual/seasonal maintenance, no fence that would divert or exclude livestock movement and distribution.

Alternative 2

The proposed action would have the following effects on livestock grazing:

- Livestock would be excluded from the affected pasture for a minimum of two growing seasons to allow for establishment of seeded species in disturbed areas.
- Riparian areas (approximately 1.25 acres) would be fenced until riparian plantings were resistant to browsing.
- Fence maintenance and responsibility to exclude livestock from riparian area enclosure.
- Permanent reduction of approximately 3 acres associated with palustrine wetland development.
- A hardened crossing would be installed to focus livestock access to South Fork Crab creek and facilitate livestock crossings while minimizing impacts to riparian and aquatic resources.

The proposed action would reduce available forage on approximately 3 acres. The wetland enhancement sites are dominated by riparian species with an estimated forage production of 2,000 pounds per acre (USDA NRCS 2015), representing 6,000 total pounds of available forage. The best way to derive daily forage demand (dry-matter basis) of a ruminant animal is to multiply their body weight by 2% (Holecheck et al. 1989). Based on a mature weight of 1000 pounds, the permanent reduction in available forage for livestock consumption is equivalent to an estimated 10AUMs. The long-term removal of livestock from the 1.25-acre enclosure is an additional 2 AUMs; the total reduction of available forage, equates to 12 AUMs or 33% of the current use of the West pasture.

The reduction of available forage would not affect the preference AUMs of lease, but may impact the authorization of temporary non-renewable AUMs that have historically been available. At the current stocking level of the West pasture, the distribution and use pattern would be moderately altered due to the palustrine wetland development and bank enhancement aspects of the project. The temporary removal of livestock for two growing seasons, to allow for construction and re-vegetation would have a slight effect to the livestock operations.

The proposed fence and wetland enhancement would alter the existing travel patterns and livestock distribution in the West pasture. The rock aggregate would draw livestock to existing crossing point, providing access to drinking water and providing stable footing in which to cross South Fork Crab Creek. Shrub and tree plantings within the 1.25-acre enclosure would provide additional shade and woody browse for livestock and wildlife. Riparian enhancements (contoured banks and plantings) may encourage greater livestock use of bank areas along South

Fork Crab Creek. The temporary fence would exclude livestock until removed. Once removed, livestock may concentration along the creek channel due to accessibility from contoured banks and the presence of woody browse and shade. This effect may be mitigated by duration and season of use of livestock grazing.

10.5. Issue 5: Noxious Weeds and Invasive Plants

Affected Environment

A variety of noxious weeds and invasive plants are present (occur in or in close proximity to) in the project area, including: cheatgrass (*Bromus tectorum*), reed canarygrass (*Phalaris arundinacea*), knapweed (*Centaurea spp.*), Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), musk thistle (*Carduus nutans*), rush skeletonweed (*Chonddrilla juncea*), dalmation toadflax (*Linaria dalmatica*), common mullien (*Verbascum thapsus*), common St. Johnswort (*Hypericum perforatum*), whitetop (*Lepidium draba*) and others. Densities of these species in the project area have not been quantified.

Herbicide control methods have been used in the East pasture of the Rocky Ford Allotment to treat leafy spurge (*Euphorbia esula*) and Russian knapweed (*Rhaponticum repen*). Additional weed species have included Canada thistle, bull thistle, common mullien, rush skeletonweed, St. Johnswort, spotted knapweed (*Centaurea stoebe*), and hounds tongue. These species are present in the Crab Creek drainage. All herbicide applications on federally managed lands follow manufacturer herbicide label instructions, specifications, and precautions; all federal, state and local laws, rules and regulations; and BLM policy. Herbicide treatments are implemented in accordance with standard operating procedures (SOPs) as outlined in the Record of Decision for the PEIS (BLM 2007). In instances where herbicide labels, federal, or state stipulations overlap, the more restrictive criteria applies.

Currently, little of the project area (< 3 acres) has disturbance creating bare ground susceptible to introduction or spread by noxious weeds or invasive plants.

Environmental Consequences

Alternative 1

Under Alternative 1 (the No Action), no soil or vegetation disturbance or displacement would occur. The potential for expansion and establishment of noxious weeds and invasive plants would be limited based on the stability of the current site. Seed transport by recreation activities, wildlife, birds, wind, water and gravity would continue to contribute to limited expansion and establishment of noxious weed and invasive plants. Management actions that would influence noxious weeds and invasive plants in the project area would be: a) continuing livestock grazing; and b) continuing noxious weed control efforts. Noxious weed management using herbicides and livestock grazing under terms and conditions similar to current direction would be predicted to result in the following conditions for noxious weeds and invasive plants:

- Presence and densities of noxious weeds would be predicted to remain similar to current conditions. Multiple noxious weeds and invasive plant species would continue to occur

in the project area. However, plant functional/structural groups would remain intact at the pasture level.

- Alternative 1 would not include new disturbance acres associated with ongoing grazing and noxious weed management. Alternative 1 would result in negligible disturbance during key weed phenology periods.

Alternative 2

Under Alternative 2, management actions that would influence noxious weeds and invasive plants in the project area would be: a) construction of a temporary and permanent hardened creek crossing; b) excavation and required traffic/ travel for riparian enhancement and wetland enhancements; c) creating and planting of spoils piles; d) minor modifications in livestock grazing; and e) post-construction noxious weed management.

Alternative 2 would install a hardened crossing covering approximately 45,000 square feet. At the end of construction, the total footprint for this crossing would be covered by rock. Limited invasive species would be anticipated in this construction area. Riparian enhancement treatments would disturb approximately 1.25 acres. The disturbance of soils within the channel increases the potential for noxious weed establishment due to potential sources from both up and down-stream locations. When Crab Creek runs at bank full, water backs up into South Fork Crab Creek depositing sediment and potential weed seed (2014 high flow event). During treatments an invasive species (reed canarygrass) would be removed, coir matting would be installed and planted with natives, and noxious weed control using herbicides would be employed to minimize establishment and spread of noxious weeds and invasive plants. Wetland enhancement would include excavation of approximately 3 acres. Wetland enhancement areas would be planted with native species and weed control would be applied to minimize noxious weeds and invasive plants. Spoils piles would be developed covering approximately 2.7 acres. These areas would include exposed soils. However, these areas would be seeded with native species and weed treatments would be applied to control noxious weeds and invasive plant species. Finally, during construction compaction could occur on approximately 30 acres, associated with vehicle traffic (Section 10.2). This compaction would not necessarily lead to exposed soils, but could damage existing plant communities and facilitate introduction and spread of noxious and invasive species. Design features would limit this spread (Section 8).

In summary, soil disturbance and displacement associated with excavation and transport of spoil piles would increase the probability of noxious weed and invasive species spread. Areas denuded of vegetation allow for initial establishment of invading species from which subsequent spread can occur. The potential for expansion and establishment increases, as disturbance and displacement of stable sites increases.

Alternative 2 would be predicted to lead to approximately 8 acres of temporarily disturbed area, open during portions of key weed phenology (growth, seed set/drop). Approximately 3 acres of this disturbed area (spoils piles) would remain open for a longer time and would be predicted to be more difficult to control. Thus, Alternative 2 would lead to up to 8 acres of areas with a temporary increase in presence of noxious weeds and invasive plants species. However; re-vegetation of spoil piles, weed mats and spot herbicide treatments would minimize the potential

establishment and spread of noxious weeds and invasive plants in the disturbed sites. The livestock crossing area would be covered with a rock aggregate to stabilize this site.

The indirect (longer term) effects of Alternative 2 on presence of noxious weeds and invasive plants would include 5 acres in which the density of an invasive species (reed canarygrass) would be potentially reduced, native species densities increased, and the presence of other invasive plant species eliminated.

The sites would require regular monitoring for detection of noxious weeds and invasive plants and appropriate treatment through an integrated weed management plan. Target species would be directly affected; preventing reproduction capabilities or causing mortality. When using herbicide; treatments would be site specific and selective, targeting noxious weeds and invasive plant species. Non-target plant species may be directly affected depending upon their proximity to target species and susceptibility to herbicide. Threatened, endangered and sensitive plants are not present and would not be affected by the use of herbicides in project area.

10.6. Issue 6: Vegetation

Affected Environment

Vegetation in the project area consists of:

- Wet meadows primarily dominated by reed canarygrass and Kentucky bluegrass.
- Riparian vegetation-along South Fork Crab Creek, with one area up-stream and upslope from the channel primarily dominated by Douglas hawthorn.
- Shrub-steppe uplands dominated by big sagebrush (*Artemisia tridentate),* Idaho fescue (*Festuca idahoensis*), and to a small extent threetip sagebrush (*Artemisia tripartite*) transitioning into stiff sagebrush (*Artemisia rigida)* and Sandberg bluegrass (*Poa secunda)* on shallow soils.

Both the wet meadows and other riparian areas include a component of non-native species: quack grass (*Elymus repens*), cheatgrass, curveseed buttercup (*Ceratocephala testiculata*), tumblemustard (*Descuraina pinnata*), Russian knapweed, St. Johnswort, and whitetop. Transition areas between the shrub-steppe and riparian areas support Great Basin wild rye, rose, and currant.

Adjacent habitats include more diverse native wetlands to the south, which provide open water and emergent vegetation habitats consisting of cattails, bulrush, and sedges. A county road borders the east side of the project area with a small area of non-native poplar trees associated with a spring along this road. The main stem of Crab Creek with some intact native riparian habitat runs east-west along the north side of the project area.

Environmental Consequences

Alternative 1

No riparian or wetland enhancement would occur. The effect of this alternative on vegetation would be the continued presence of non-native species across the landscape with pasture grasses and reed canarygrass dominating. Noxious weeds such as Russian knapweed, St. Johnswort, and white top would continue to thrive.

Alternative 2

Hardened Crossing. The effects of the proposed action on vegetation from the installation of a hardened creek crossing (Section 7.2) would require the disturbance of a small amount of vegetation mostly non-native grasses when the area is excavated (< 2 acres). Indirectly the use of the hardened crossing would allow for adjacent banks to have decreased use thus vegetation would help to stabilize those banks. The direct effect would be a permanent loss of vegetation at the crossing and continual disturbance of vegetation on the areas for the approach and exit of the crossing (< 2 acres).

Riparian Bank Enhancement. The effects of the proposed action on vegetation would be temporary removal of some vegetation in areas where the banks would be redesigned into terraces and soil is moved. This would primarily be a removal/ disturbance of non-native grasses. Spoil material used for enhancement consists of material historically removed from the channel that currently resides on the bank. Heavy equipment would be used (see Section 7.2) to create the enhancement. Design features (see Section 8) would reduce the impacts of the equipment on native vegetation and spreading non-native species. Additional spoil materials excavated from the bank enhancement would be placed in designated areas that are currently dominated by non-native species (see spoil areas below). Any intact soils below the reed canarygrass root zone would be salvaged and spread on the finished banks, where feasible.

Additional bank enhancements by installation of coir matting, weed control fabric, and weed treatments would indirectly lead to the re-establishment of native plant species in the area. Noxious weeds and other invasive plants would be reduced thus giving native plants the opportunity to use available nutrients without competition from non-native species.

About 20,000 square feet would be planted and seeded with native riparian plants including trees and shrubs to help support bank stabilization. Those microsites that already contain native vegetation would be avoided. Indirectly the primarily non-native dominated areas would convert to native riparian vegetation. The overall health of the banks of this area of Crab Creek would improve. Native species including chokecherry, rose, blue elderberry, red osier dogwood, willow, alder, black cottonwood, water birch, and other natives would become established on this reach of Crab Creek. In order to protect these plantings from impacts of herbivory and grazing, the planting area on both sides of the creek would be temporarily fenced. The fence itself would create minimal impact to vegetation as the area would already be disturbed.

Wetland Enhancement. Two areas, equaling about 3 acres, in the floodplain of the creek would be excavated (see spoils area discussion below) to produce palustrine wetlands. Areas around the deeper excavated areas would be planted with native hardwoods including coyote willow and red osier dogwood. Weed matting, cages, and fencing would be used to decrease competition and the effects of herbivory (see discussion above under Riparian Bank Enhancement). These areas, over time, would have an increase in cover and density of native riparian and wetland plant species.

Spoil Areas. The effects of the proposed action on vegetation from the creation of 1-2 spoil areas would be just less than three acres of currently mixed sage-steppe habitat covered with spoils from above mentioned activities. In the short term there would be a loss of native vegetation until mitigation measures for seeding and weed control are initiated (see Design Features above). Typically seeded grasses germinate within one to two seasons. Both native and non-native plant species are expected to colonize the spoils piles over time. Design features for noxious weed control are in place to limit the spread of noxious weeds and invasive plants. Even with control actions, some noxious weeds and invasive plants would establish on the spoil piles because a seed bank is already present in these materials. Monitoring and post implementation noxious weed treatments would reduce the likelihood of establishment and spread of noxious weeds and invasive plants.

In summary, Alternative 2 would result in direct removal of less than 8 acres of vegetation through excavation, compaction, and deposition of fill. Presence and density of native plants would increase over time as the disturbed area would be seeded with native plants and noxious weeds would be treated. During project construction, approximately 30 acres of vegetation would be disturbed. Much of the disturbed areas within the project area would be seeded or replanted with native species, reducing the likelihood that noxious weeds and invasive plants would spread.

11. Cumulative Effects

Cumulative effects are those that result from adding the direct and indirect effects of the proposed action, to effects from other past, present and reasonably foreseeable future actions. These additional effects are considered regardless of what agency or person undertakes such actions (40 CFR 1508.7). The cumulative effects analysis area for this EA is defined as all land, regardless of ownership, in and adjacent to the analysis area influencing indicators selected for analysis in this EA. The temporal boundary used when analyzing cumulative effects in this analysis was 10 years.

In this EA, the impacts of past and present actions occurring in the project area have been analyzed as part of the environmental baseline, to the extent that they affect indicators in the analysis area. Past and present cumulative actions include agriculture occurring outside of BLM-administered areas (privately-owned lands), an adjacent roadway, and private livestock grazing on adjacent shrub-steppe areas.

Issue 1: Aquatic Resources. There are no known reasonably foreseeable future actions that would affect aquatic resources in the analysis area. The impacts of existing land uses on aquatic

resources, including upstream agriculture uses and grazing on private lands, have been incorporated as part of the environmental baseline for aquatic resources (streams and wetlands) in the affected environment (Section 10.1).

Issue 2: Soils. There are no known reasonably foreseeable future actions that would affect soils in the analysis area. Ongoing land use practices outside of the project area, including agriculture, have been incorporated as part of the environmental baseline for soils in the affected environment (Section 10.2).

Issue 3: Wildlife. There are no known reasonably foreseeable future actions that would affect wildlife in the analysis area. Washington Department of Fish and Wildlife and BLM have ongoing shrub-steppe restoration actions that would affect the fitness of greater sage-grouse using the Crab Creek PAC. However, these actions are more than 50 miles from the project area and would not influence sage-grouse habitat in the project area.

Issue 4: Livestock Grazing. There are no known reasonably foreseeable future actions that would affect livestock grazing in the analysis area. The impacts of adjacent grazing on private lands have been incorporated as part of the environmental baseline for livestock grazing in the affected environment (Section 10.4). Modifications in BLM's lease terms and conditions associated with the proposed action (Section 7.2) could influence grazing indicators on adjacent lands, as the affected lessee may seek other pastures or forage sources. This indirect effect of the action would be small, and making assumptions about how this impact would occur would be speculative.

Issue 5: Noxious Weeds and Invasive Plants. There are no known reasonably foreseeable future actions that would affect noxious weeds and invasive plants in the analysis area. Existing weed introduction sources, including adjacent roads, livestock, and adjacent land uses, have been incorporated as part of the environmental baseline for weeds in the affected environment (Section 10.5). Ongoing weed treatment activities have also been included in the environmental baseline for weeds in the affected environment (Section 10.5). BLM knows of no upcoming construction projects or other ground-disturbing projects in the analysis area.

Issue 6: Vegetation. There are no known reasonably foreseeable future actions that would affect vegetation in the analysis area. Ongoing weed treatment activities have also been included in the environmental baseline for vegetation in the affected environment (Section 10.5). BLM knows of no upcoming construction projects or other ground-disturbing projects in the analysis area that would impact vegetation.

Table 4. Environmental Consequences Summary. FAR is functional-at-risk; PFC is properly functioning condition; NT is no trend; + is a predicted positive trend in the indicator compared to the current affected environment; - is a predicted negative trend in the indicator; CY is cubic yards; P/A is presence/absence.

Resource / Issues		Alternatives	
Aquatic resources	Units	No Action	Proposed Action
Lotic (stream) Functional classification	PFC class	FAR (NT). Limited overstory, weeds, localized bank impacts	FAR (upward trend)
Stream shading	% cover	0%	+: 25% canopy cover target in project area
Water quality	303 (d) indicators	303(d) listed: pH, DO, bacteria	+: 303(d) listed, on-site decreases in bacteria and nutrient addition
Wetland fill	CY	0	< 25 CY
DOE wetland rating	Class	III (low value)	+: II (moderate value)
Lentic (wetland) Functional classification	PFC class	PFC, not fully meeting potential	+: PFC, closer to meeting potential
Soils		No Action	Proposed Action
Soil loss, exposure	CY	None, controlled by rhizomatous reed canarygrass	Excavation of 2,750 CY
Soil compaction	Ac.	Negligible, seasonal cattle use.	Estimated 30 acres from construction vehicles
Wildlife		No Action	Proposed Action
Wildlife Habitat	Ac./ft.	Habitat would remain largely unused by wildlife due to dominance of reed canarygrass and lack of wetland conditions.	Creation of 3 acres of wetland and 500 feet of riparian habitats increasing the numbers and diversity of waterfowl, bats, frogs, and mule deer.
Disturbance	Species, days	No displacement of mule deer or migratory birds.	Displacement of mule deer and migratory birds for 3 weeks during the non-breeding season.

Resource / Issues		Alternatives	
Livestock grazing		No Action (Alternative 1)	Proposed Action (Alternative 2)
Reduction in Available Forage	AUMs	None	Short term: 2 growing seasons of no grazing. Long term: Reduction of 12 AUMs associated with wetland enhancement. (No change in preference AUMs.)
Livestock distribution	use	Livestock would continue to forage on both sides of South Fork Crab Creek using the existing crossing point. Livestock would continue to use crossing point to access drinking water.	Livestock would transfer more use from riparian, reed canarygrass meadow to upland bunch grass species or adapt to the use of other riparian species. The fence would create a physical barrier re-directing or changing traffic and grazing patterns. Impacts may be mitigated by duration and season of use.
Noxious Weeds		No Action	Proposed Action
Presence noxious weeds and invasive plants	P/A	Noxious weeds and invasive plants would remain present in and near project area: reed canarygrass, thistles, Dalmatian toadflax, white top, and knapweed.	Establishment and expansion potential increases due to soil disturbance. Treatment mats and revegetation of disturbed site would reduce likelihood for establishment and expansion.
Disturbed areas	Ac.	None.	Temporary 8 acres.
Vegetation		No Action	Proposed Action
Plant habitat change	Ac.	Habitat would remain dominated by non-native vegetation. Existing noxious weeds and invasive plants would likely remain at current densities. The lack of native shrubs and trees in riparian areas would continue to affect wetland function, water quality, and stream shading.	Removal of up to 8 acres of vegetation. Establishment of native plants including riparian shrubs and trees.
Disturbance	Ac.	No new disturbance. Current use patterns by humans and livestock would continue.	Approximately 30 acres of vegetation would be affected; much of affected area would be seeded or replanted with native species.

12. Tribes, Individuals, Organizations, or Agencies Consulted

National Historic Preservation Act (NHPA) Section 106 consultations for projects discussed in this EA were initiated on June 16, 2014 with the Washington State Department of Archaeology & Historic Preservation (DAHP), the Colville Confederated Tribes, and the Spokane Tribe of Indians. The DAHP concurred with the Area of Potential Effect on June 24, 2014. The BLM received concurrence with a determination of no adverse effect to cultural resources from DAHP on February 24, 2015, provided that site protection and archaeological monitoring takes place as recommended. The Colville Confederated Tribes and the Spokane Tribe of Indians were also notified of the project and the findings.

13. Glossary

Lotic: Associated with actively flowing fresh water (e.g., streams, creeks, rivers).

Lentic: Associated with still fresh water (e.g., wetlands).

Palustrine wetland: non-tidal wetlands dominated by trees, shrubs, persistent emergent plants, emergent mosses or lichens.

Potential: defined as the highest ecological status a riparian-wetland area can attain given no political, social, or economic constraints; it is often referred to as the "potential natural community."

Proper Functioning Condition (PFC): Riparian-wetland areas are functioning properly when adequate vegetation, landform, or debris is present to: dissipate energies associated with wind action, wave action, and overland flow from adjacent sites, thereby reducing erosion and improving water quality; filter sediment and aid floodplain development; improve flood-water retention and ground-water recharge; develop root masses that stabilize islands and shoreline features against cutting action; restrict water percolation; develop diverse ponding characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, waterbird breeding, and other uses; and support greater biodiversity.

14. References

Bonsignore, C., T. Blewett, and B. Heck. 2013. Monitoring Report and Management Recommendations for Restored Wetlands on the Bureau of Land Management Border Resource Area, Eastern Washington. Prepared by Ducks Unlimited, 16615 East 23rd Avenue, Spokane, WA. June 18, 2013.

Cramer, M.L. (managing editor). 2002. Integrated Streambank Protection Guidelines. Published by Washington State Aquatic Habitat Guidelines Program.

Cramer, M.L. (managing editor). 2012. Stream Habitat Restoration Guidelines. Co-published by the Washington Departments of Fish and Wildlife, Natural Resources, Transportation and Ecology, Washington State Recreation and Conservation Office, Puget Sound Partnership, and the U.S. Fish and Wildlife Service. Olympia, WA.

Dickard, M. and nine others. 2013. Proper Functioning condition assessment for lotic areas. TR 1737-15, v.2. BLM report in review. Available at: http://www.blm.gov/pgdata/etc/medialib/blm/wo/Information_Resources_Management/policy/ib_attachments/2013.Par.2589.File.dat/IB2013-023_att1.pdf.

Department of Ecology (DOE). 2012. Current EPA Approved Assessment (website). Available at: http://apps.ecy.wa.gov/wats/SearchResults.aspx.

Holecheck, J.L., R.D. Pieper, and C.H. Hervel. 1989. Considerations Concerning Stocking Rate, p. 194 in: Range Management Principles and Practices. Prentice-Hall Inc.

Hruby, T. 2004. Washington State wetland rating system for eastern Washington – Revised. Washington State Department of Ecology Publication # 04-06-15. Available at: www.wa.gov/ecology/sea/shorelan.html.

Prichard, D., and others. 1998. Riparian Area Management: User Guide to Assessing Proper Functioning Condition and the Supporting Science for Lotic Areas: Technical Reference 1737-15. U.S. Department of the Interior, Bureau of Land Management, National Applied Resource Sciences Center. Denver, CO.

Prichard, D., and others. 2003. Riparian Area Management: A User Guide for Assessing Proper Functioning Condition and the Supporting Science for Lentic Areas: Technical Reference 1737-16. U.S. Department of the Interior, Bureau of Land Management, National Applied Resource Sciences Center. Denver, CO.

Rosgen, D. 1996. Applied river Morphology. Wildland Hydrology. Pogoda Springs, CO.

Toevs, G.R., J.J. Taylor, C.S. Spurrier, W.C. MacKinnon, and M.R. Bobo. 2011. Bureau of Land Management Assessment, Inventory, and Monitoring Strategy: For integrated renewable resources management. Bureau of Land Management, National Operations Center, Denver, CO.

USDA Natural Resources Conservation Service (NRCS). 1998. Keys to Soil Taxonomy. United States Department of Agriculture Natural Resources Conservation Service. Eighth Edition.

USDA NRCS. 2001. Rangeland Soil Quality-Compaction. Rangeland sheet 4, May 2001. Available at: http://urbanext.illinois.edu/soil/sq_info/RSQIS4.pdf.

USDA NRCS. 2015. Web Soil Survey. Accessed at: http//websoilsurvey.nrcs.usda.gov/app/websoil survey.aspx.

USDA NRCS. 2015b. Farmland Protection Policy Act. Accessed at: http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/landuse/fppa/

USDA Forest Service. 2015. *Phalaris arundinacea* federal plants database. Available at: http://www.fs.fed.us/database/feis/plants/graminoid/phaaru/all.html.

United States Department of the Interior (USDI). 1874. General Land Office Cadastral Plat and Survey Notes. On file at http://www.blm.gov/or/landrecords/survey/ySrvy1.php.

USDI BLM. 2007. Record of Decision Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Final Programmatic Environmental Impact Statement. Bureau of Land Management Washington Office. Washington, DC.

USDI BLM. 2008. Rocky Ford Allotment #00652 Allotment Management Plan, EA # OR135-01-EA-08.

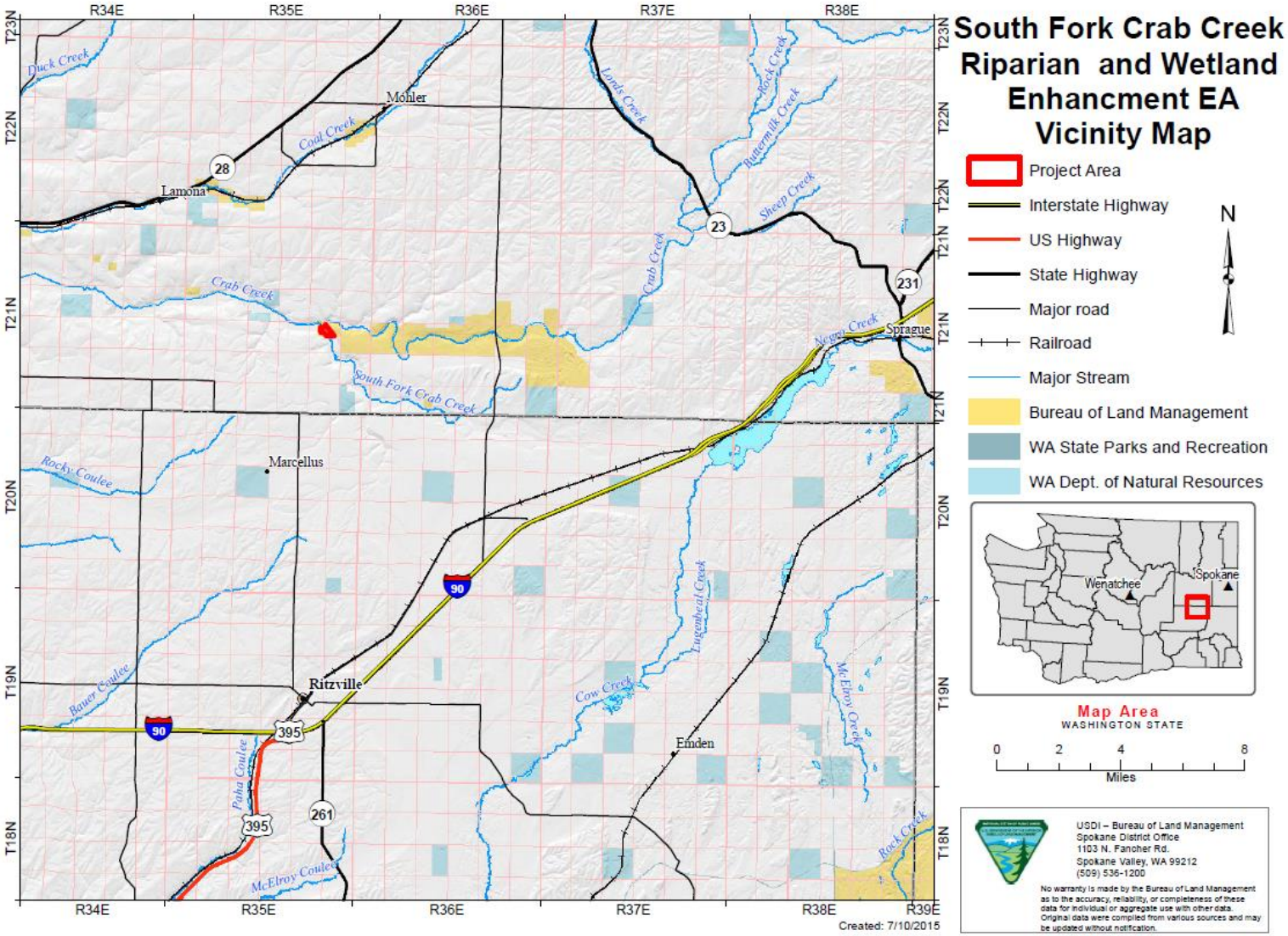
USDI BLM. 2011. Riparian area management: Multiple indicator monitoring (MIM) of stream channels and streamside vegetation. Technical Reference 1737-23. BLM National Operations Center, Denver, CO. 155 p.

USDI BLM. 2015. Bureau of Land Management GLO records, patent search. On line at http://www.glorecords.blm.gov/search/default.aspx?searchTabIndex=0&searchByTypeIndex=0/ BLM/OC/ST-10/003+1737+REV. Bureau of Land Management, National Operations Center, Denver, CO. 155 pp.

U.S. Geological Survey. 2015. USGS Streamstats Version 3 Beta. Accessed at: http://ssdev.cr.usgs.gov/v3_beta/viewer.aspx?stabbr=WA.

15. Appendix A: Figures

Figure A-1. Vicinity and Project Area Maps



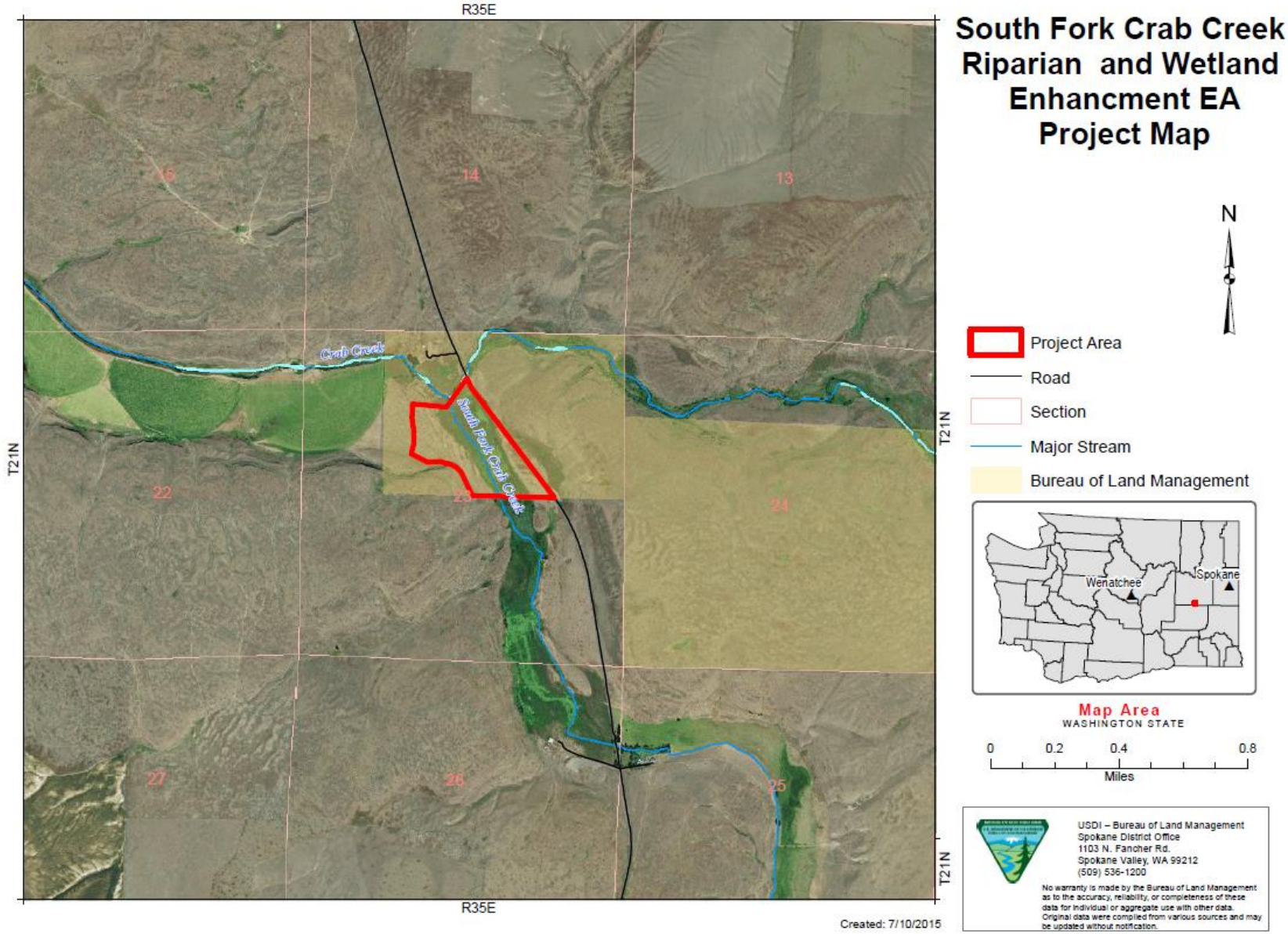
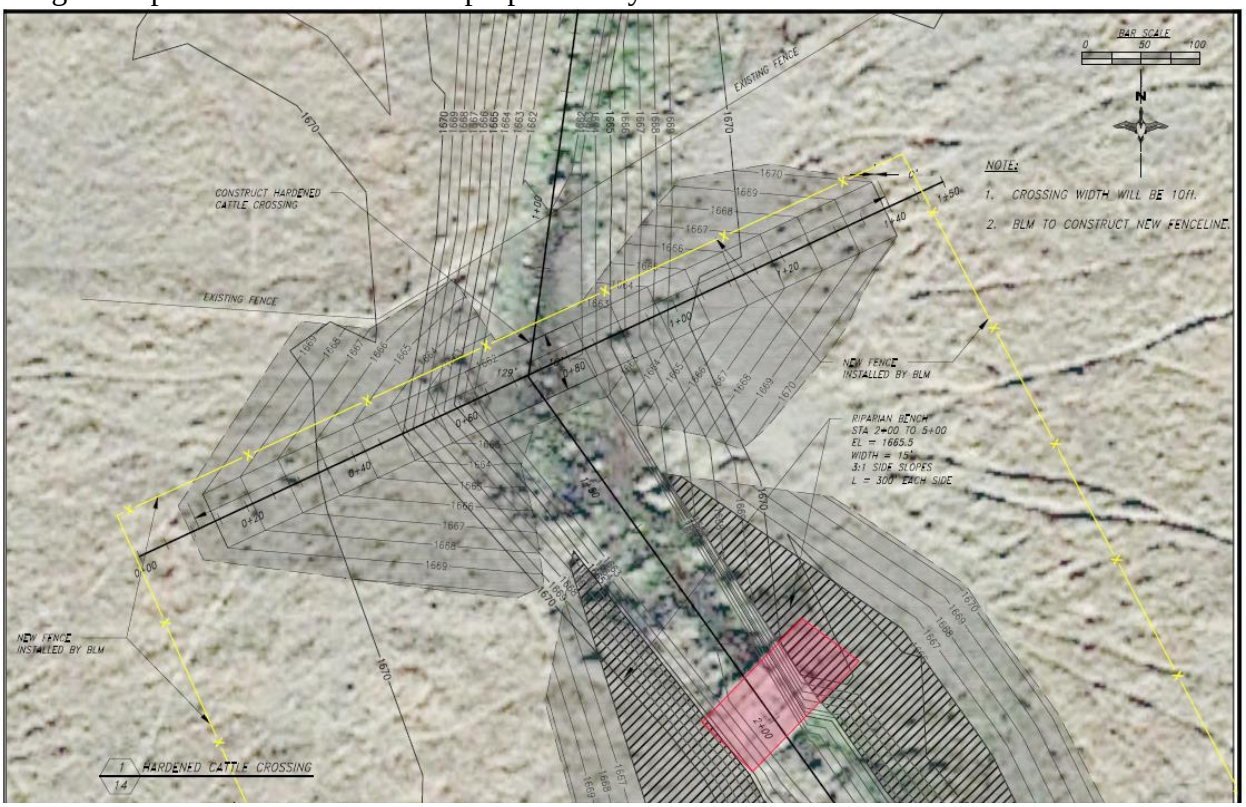
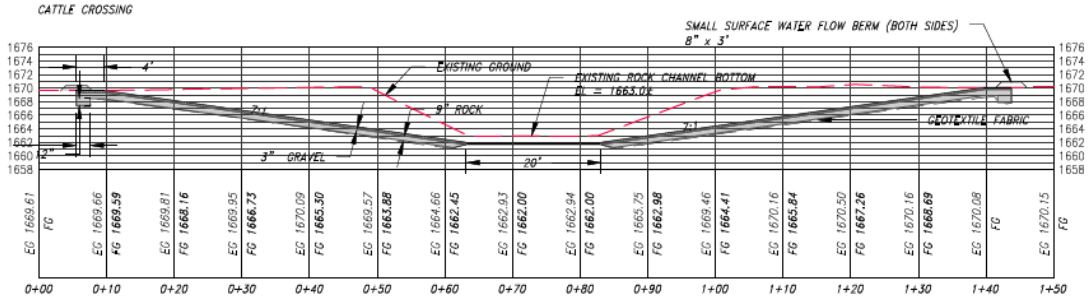

South Fork Crab Creek
Riparian and Wetland
Enhancment EA
Project Map
R35E
T21N
Crab Creek
South Fork Crab Creek
14
13
22
23
24
27
26
25
N
Project Area
Road
Section
Major Stream
Bureau of Land Management
Wenatchee
Spokane
Map Area
WASHINGTON STATE
0
0.2
0.4
0.8
Miles
USDI – Bureau of Land Management
Spokane District Office
1103 N. Fancher Rd.
Spokane Valley, WA 99212
(509) 536-1200
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources and may be updated without notification.
Created: 7/10/2015

Figure A-2. South Fork Crab Creek hardened crossing preliminary engineering designs. These designs are provided for illustration purposes only.

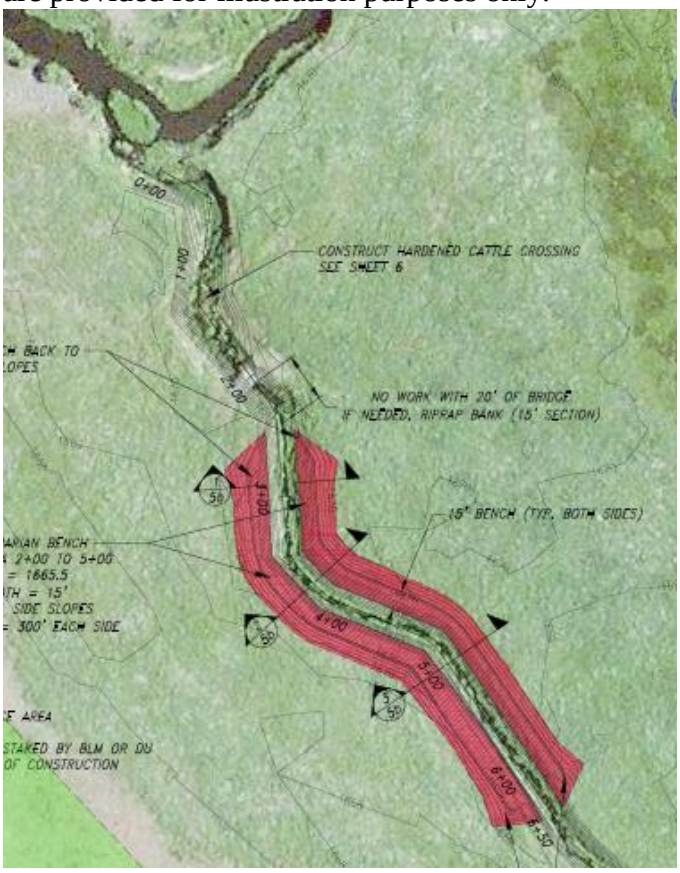




1 HARDENED CATTLE CROSSING
14 PROFILE

NOTE:
SEE PLAN VIEW, SHEET 13

Figure A-3. South Fork Crab Creek bank enhancement area. Preliminary engineering designs are provided for illustration purposes only.



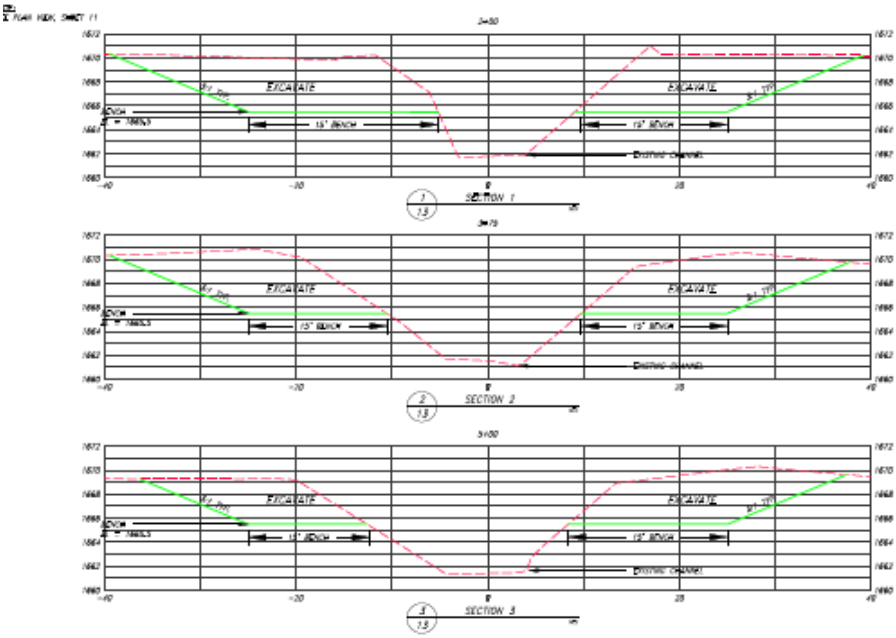


Figure A-4. South Fork Crab Creek wetland enhancement areas. Preliminary engineering designs are provided for illustration purposes only.

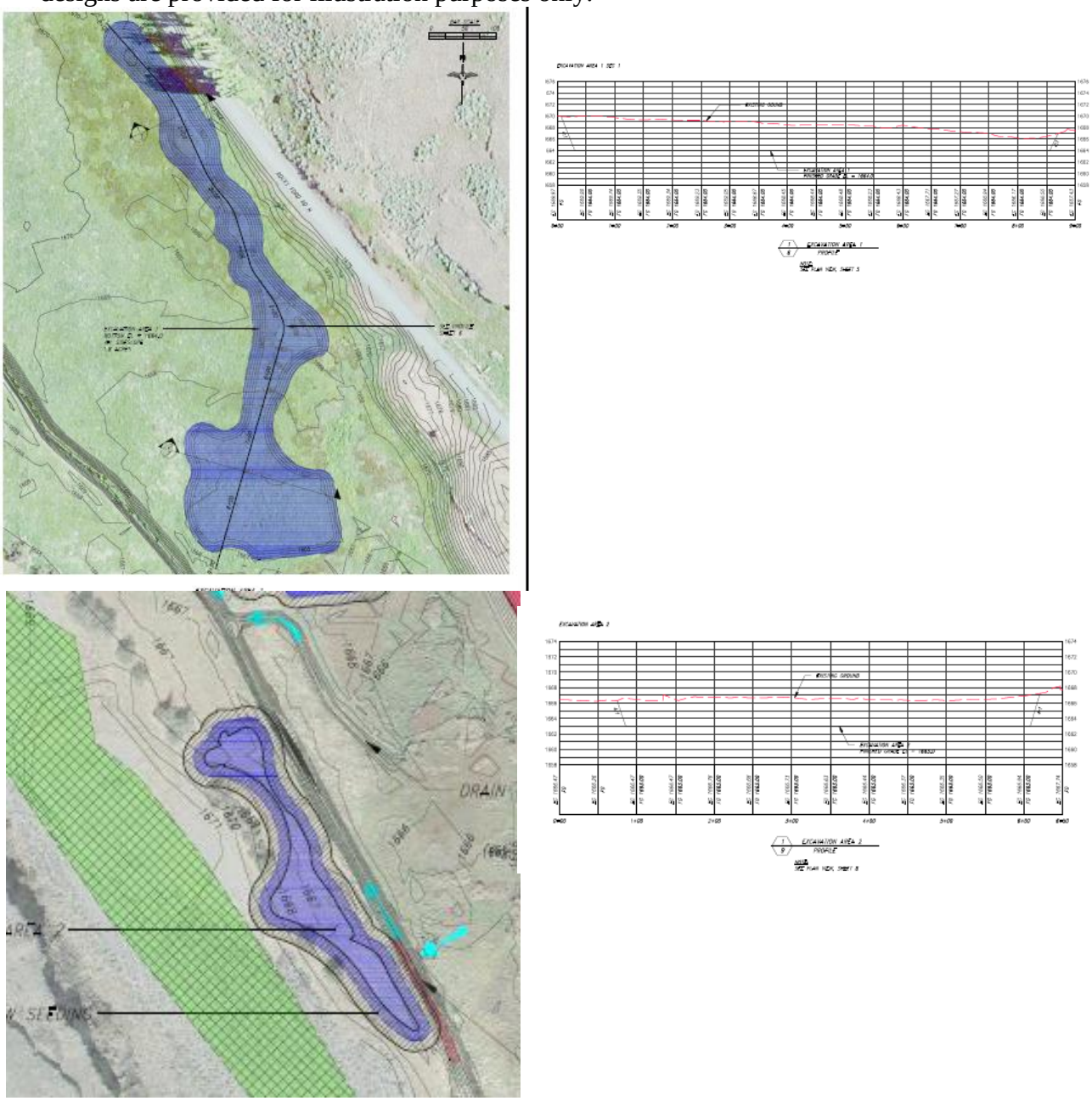


Figure A-5. South Fork Crab spoils areas, depicted in green. Preliminary engineering designs are provided for illustration purposes only.

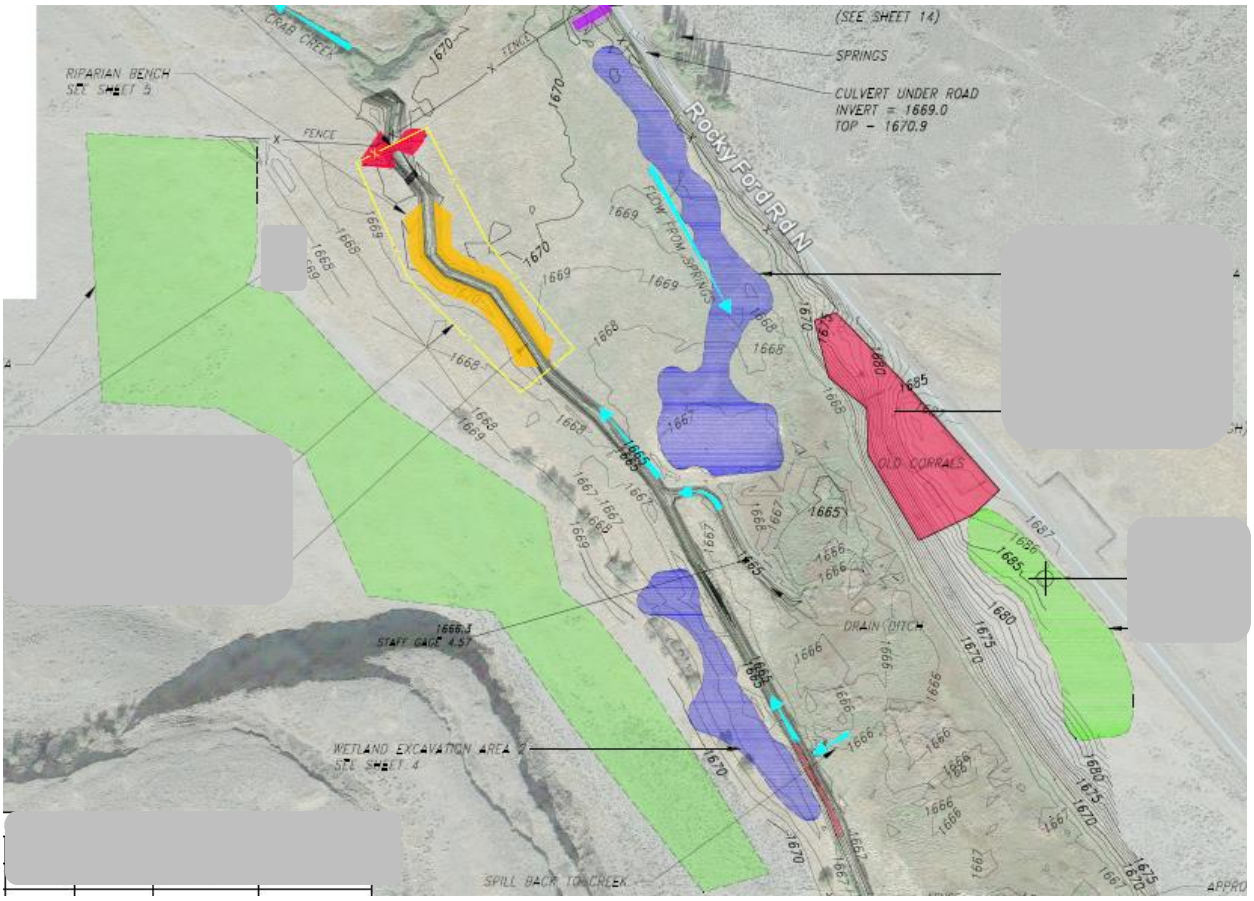
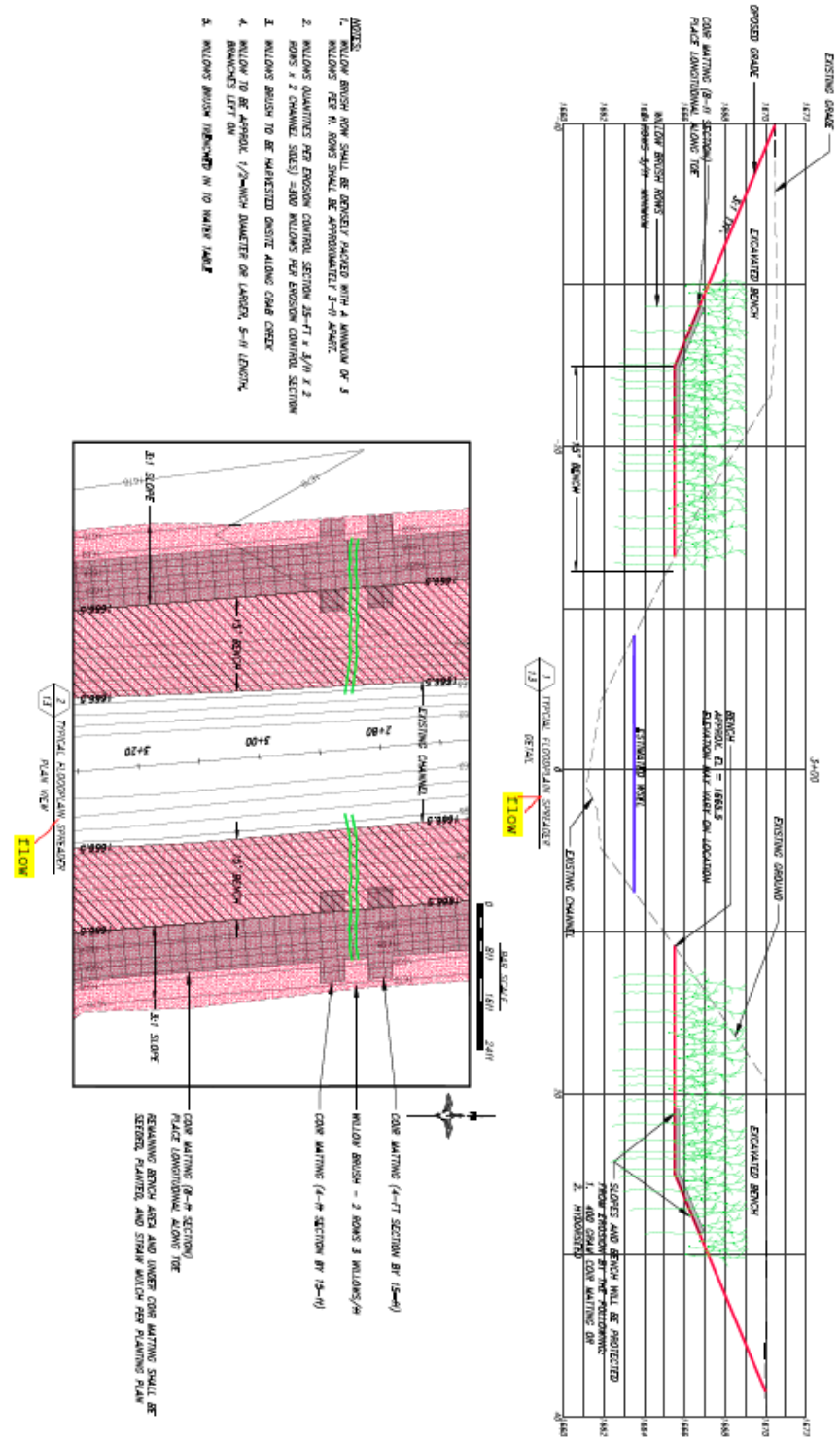



Figure A-6. Trenched willow wattles. Preliminary engineering designs are provided for illustration purposes only.