

Yankee Fork Fluvial Habitat Rehabilitation Plan
Yankee Fork of the Salmon River, Custer County, Idaho

2013 Working Version

Prepared by

Edward W. Lyon, Jr., U.S. Department of the Interior, Bureau of Reclamation

Evelyn Galloway, Shoshone-Bannock Tribes

Prepared for

Yankee Fork Interdisciplinary Team

July 2013



This page intentionally left blank

YANKEE FORK FLUVIAL HABITAT REHABILITATION PLAN

The Yankee Fork of the Salmon River (Yankee Fork River) is located in Central Idaho northeast of the town of Stanley and is one of the larger watersheds (190 square miles) within the Upper Salmon subbasin. Over 90 percent of the watershed is managed by the U.S. Department of Agriculture, Salmon-Challis National Forest, and less than 10 percent of the lands are private. The watershed is designated critical habitat under the Endangered Species Act and is considered a high-priority habitat in NOAA's National Marine Fisheries Service (NOAA Fisheries) Federal Columbia River Power System 2008 Biological Opinion (NOAA Fisheries 2010). Fish species of interest include spring/summer Chinook salmon (*Oncorhynchus tshawytscha*), steelhead (*O. mykiss*), bull trout (*Salvelinus confluentus*), and westslope cutthroat (*O. clarki lewisi*).

The Shoshone-Bannock Tribes (Tribes) have been working under contract with the Bonneville Power Administration (BPA) to improve aquatic and terrestrial habitat conditions along the lower dredged section of the Yankee Fork River since 2005. In May 2008, the Tribes submitted to BPA a proposal for the Yankee Fork Floodplain Restoration Project Implementation Plan for 2008-2018. In July 2008, the Northwest Power and Conservation Council (NPCC) requested a review of the proposal by the Independent Scientific Review Panel (ISRP). The ISRP reviewers found no compelling evidence of potential benefits to aquatic or terrestrial wildlife and requested more information on how the dredged section of the Yankee Fork River has changed, what the limiting factors for fish production are, and a prediction of what could be gained through rehabilitation actions (ISRP 2008).

In response, the Yankee Fork Interdisciplinary Team (IDT) was created as a Watershed Action Group following the 2008 ISRP review. The Tribes have participated in and worked collaboratively within the IDT forum that is comprised of technical specialists from the U.S. Bureau of Reclamation (Reclamation), BPA, U.S. Forest Service (USFS), Trout Unlimited, U.S. Fish and Wildlife Service (USFWS), NOAA Fisheries, Idaho Department of Fish and Game (IDFG), and other stakeholders that have local knowledge of the watershed and the fisheries resources.

Beginning in 2010 and extending through 2012, the *Yankee Fork of the Salmon River Tributary Assessment, Upper Salmon Subbasin, Custer County, Idaho* (Tributary Assessment) was completed (Reclamation 2012a). This Tributary Assessment is an analysis of the drivers and controls occurring at the geomorphic province, scaling down to the valley segments. The Yankee Fork subwatersheds were used to organize the data and other information collected for the Tributary Assessment. The subwatersheds identified along the Yankee Fork River included (1) the Upper Yankee Fork subwatershed from the headwaters to its confluence with Eightmile Creek, (2) the Middle Yankee Fork subwatershed from Eightmile Creek to its confluence with Jordan Creek, and (3) the Lower Yankee Fork subwatershed from Jordan Creek to its confluence with the Salmon River (Figure 1). Two other subwatersheds that are tributaries to the Yankee Fork River include the Jordan Creek and West Fork subwatersheds.

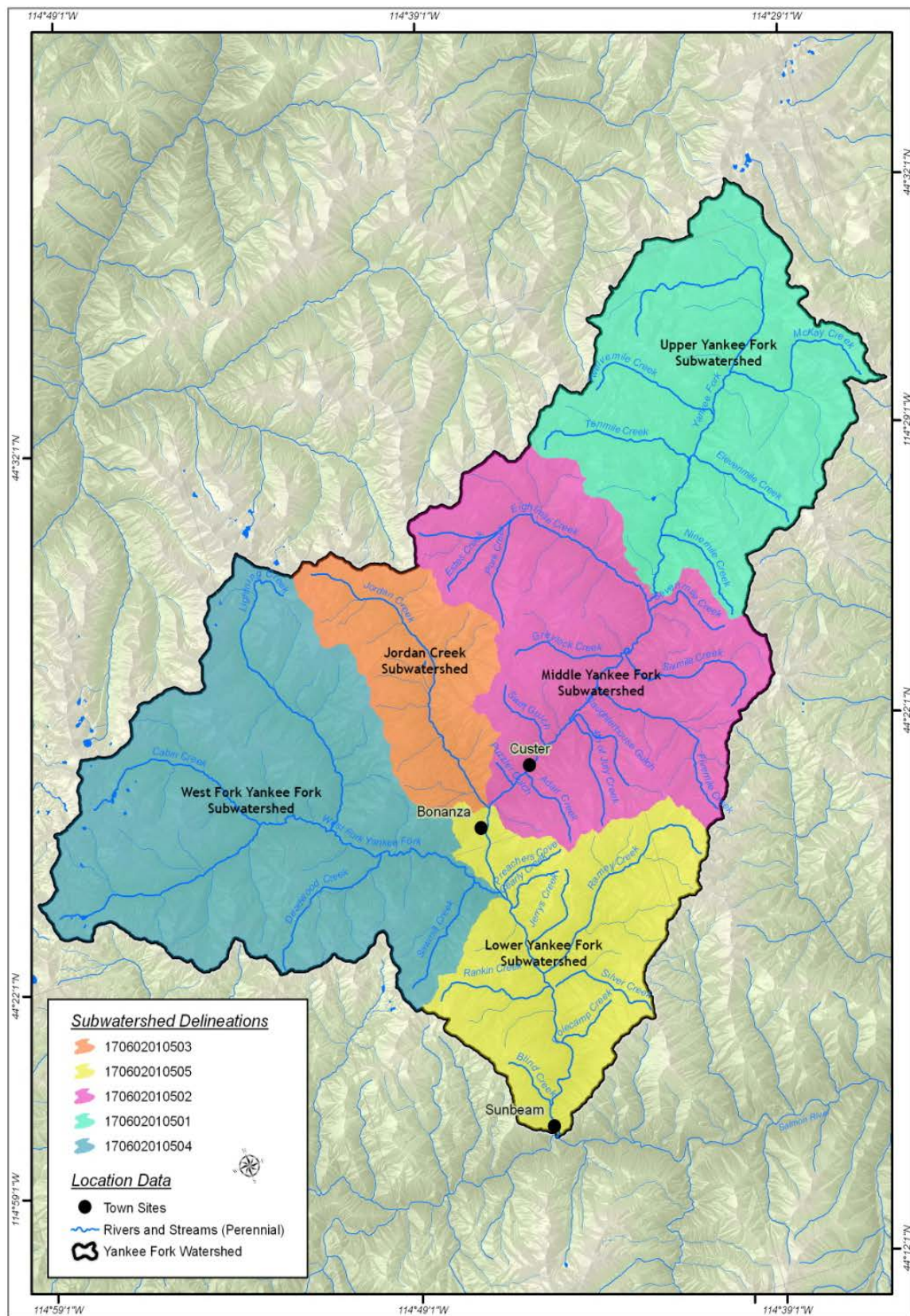


Figure 1. Yankee Fork subwatershed locations.

Three geomorphic reaches along the Yankee Fork River from about Swift Gulch (River Mile [RM] 11.2) to about Polecamp Creek (RM 2.9) were identified as having the highest geomorphic potential for change. Two of these geomorphic reaches are located in the Lower Yankee Fork subwatershed between Jordan Creek and Polecamp Creek, an area where the valley bottom had been mined by the Yankee Fork floating gold dredge in the 1940s and 1950s. Following the Tributary Assessment, reach-scale assessments (Reach Assessments) were completed on these two geomorphic reaches, known as the Bonanza Area (Reclamation 2012b) and Pole Flat Area (Reclamation 2012c). These two reaches have been the most impacted and altered and, therefore, represent the greatest potential for habitat improvement within the Yankee Fork watershed.

The third geomorphic reach was identified along the Yankee Fork River within the Middle Yankee Fork subwatershed from about Swift Gulch to Jordan Creek, and is herein referred to as the Custer Area geomorphic reach. This reach has not been as negatively impacted as the dredged areas, but has been altered by past development, hydraulic and other placer mining activities, and removal of vegetation. Unlike Bonanza Area and Pole Flat Area, no additional assessments have been conducted in the Custer Area reach.

The other geomorphic reaches along the mainstem Yankee Fork are largely intact and functioning at or near normal potential, with the exception of vegetation composition and structure primarily in the Middle Yankee Fork and Upper Yankee Fork subwatersheds. Past timber harvests have removed much of the large to mature timber along the riparian corridor and adjacent uplands, thus large and mature trees are no longer available (a) to help stabilize streambanks or to provide channel boundary roughness, and (b) are no longer recruited by the channel to create instream complexity. The vegetation has been recovering in these areas but will need a lot more time to mature.

This means that the dredged reaches, Bonanza Area and Pole Flat Area, and the Custer Area reach represent somewhere near 90 percent of the improvement potential. The exception is Jordan Creek, one of the major tributaries to the Yankee Fork. Jordan Creek has been identified for future actions that predominantly benefit steelhead, bull trout, and westslope cutthroat.

Existing, historic (pre-European settlement), and target conditions are discussed in the *Bonanza Area Reach Assessment, Yankee Fork of the Salmon River, Upper Salmon Subbasin, Custer County, Idaho* (Reclamation 2012b) and *Pole Flat Area Baseline Condition Assessment, Yankee Fork of the Salmon River, Upper Salmon Subbasin, Custer County, Idaho* (Reclamation 2012c). No additional assessments were completed for the Custer Area geomorphic reach or other geomorphic reaches.

The Yankee Fork River has never occupied the entire valley bottom width since the Pleistocene glaciations which ended about 10,000 years before present. Following post-Pleistocene runoff, the Yankee Fork occupied a relatively narrow corridor within the greater valley area, confined by large terraces and alluvial fans created and deposited during the much

greater runoff and sediment transport regimes associated with glacial episodes and melting. The valley bottom is now largely covered with dredge tailings. Most of the dredging occurred in the older, Pleistocene-age terrace deposits, that prior to dredging, confined the Yankee Fork, and still do. The Yankee Fork through the Pole Flat Area reach was and is relatively straight and moderately confined by Pleistocene terraces, alluvial fans, and valley walls. Small floodplain patches did and do exist and, where these coincide with tributary streams, these provided habitat benefits. The greatest impacts to the Pole Flat Area reach are disconnection of a number of these small tributaries and loss of the interaction of those tributaries with the floodplain patches. Encroachment of dredge tailings has resulted in slight increases in confinement and loss of minor areas of floodplain throughout the reach as well (Reclamation 2012a, 2012c).

The Yankee Fork River through the Bonanza Area reach was also relatively straight and moderately confined, but with some unconfined segments. Within the Bonanza Area reach, a number of larger floodplain patches existed and the West Fork/Yankee Fork confluence area was unconfined and more dynamic than it is today. There likely would have been a few side channels associated with the larger floodplain patches as well as significantly more large woody material throughout the reach. While this reach was largely a migration corridor with scattered patches that may have been used for spawning and rearing, impacts over the past 150 years have resulted in this reach being much more confined and less dynamic resulting in less available spawning and rearing habitats as well as less favorable migration conditions at some biologically significant flows (Reclamation 2012a, 2012b).

In the Custer Area reach, the Yankee Fork River was and is relatively straight and moderately confined. Past removal of vegetation along the river corridor and uplands have negatively impacted the channel's form and function. The loss of large, mature trees has reduced streambank stability and channel boundary roughness, and the lack of large wood available for recruitment has led to simplification of the channel dynamics. This reach is used by anadromous fish primarily for spawning and rearing and as a migratory corridor. Reintroducing large wood into the system through placement of wood structures along and in the channel and loading the floodplain with wood for future recruitment should provide more bedform diversity, improve channel geometry, and increase gravel sorting and retention. In some potential project locations there are topographic features (i.e., embankments) that do interfere with floodplain connectivity and their modification or removal should be considered as part of the alternatives analysis (Reclamation 2012a).

All habitat rehabilitation actions included in this report are identified as physically possible and may provide additional benefits. Treatment at any one project area may or may not include all of the listed rehabilitation actions. In addition, several of the identified actions may only represent an artificially created increase or improvement to habitats. Three tiers described in Table 1 were chosen based on an interim sequencing strategy proposed by Roni, Hanson, and Beechie (2008). This prioritization method is simply a means to sequence rehabilitation actions. It is not a method of determining if certain actions should occur and additional alternatives analysis will be necessary prior to project implementation.

Table 1. Tiers used to sequence rehabilitation actions.

Tier 1	Monitor and maintain: protect high quality functioning habitats, and water quality and quantity.
	Reconnect historic channel and floodplain interactions: re-establish dynamic channel and floodplain interactions where they have been disconnected through anthropogenic disturbances.
	Tributary reconnect: re-establish fish access to tributaries that have been disconnected through anthropogenic disturbance.
	Floodplain enhancement and instream complexity: re-establish channel dynamics and floodplain interactions by increasing floodplain patch size, creating or improving side channel habitats, planting appropriate vegetation, placing large wood for fish cover and complexity, and constructing instream structures (i.e., constructed riffles, boulder, and/or wood placements).
Tier 2	Tributary enhancement: improve juvenile fish access into tributaries by changing channel and/or floodplain geometry, increasing channel boundary and/or instream roughness, and planting or improving riparian buffer zone.
Tier 3	Adaptive management: monitor rehabilitated areas, and modify past rehabilitation actions to improve and/or diversify habitats and processes to maximize fish benefits.

Table 2 shows the order and organization of *Prioritization of Rehabilitation Actions* Tables and corresponding Plates. The *Relative Geomorphic Potential for Change* column is a relative comparison between valley segments and geomorphic reaches based on the affects that rehabilitation actions would have on habitat-forming processes.

Table 2. Organization of Prioritization Tables and Plates.

Subwatershed	Valley Segment or Geomorphic Reach	Relative Geomorphic Potential For Change	Existing Channel Description
Upper Yankee Fork (Table 4, Plate 1)	Headwaters (RM 29.8-22.7)	Moderate	Unconfined to moderately confined, free-formed alluvial channel
	Twelve Mile Area (RM 22.7-20.4)	Moderate	Predominantly a moderately confined, free-formed alluvial channel
	Nine Mile Area (RM 20.4-17.7)	Moderate	Predominantly a moderately confined, free-formed alluvial channel
	Eight Mile Area (RM 17.7-16.3)	Moderate	Unconfined, free-formed alluvial channel
Middle Yankee Fork (Table 5, Plates 2 & 3)	Greylock Area (RM 16.3-13.2)	Moderate	Unconfined, free-formed alluvial channel
	Canyon Area (RM 13.2-11.25)	Low	Confined, bedrock channel
	Custer Area (RM 11.25-9.15)	Moderate-High	Predominantly a moderately confined, free-formed alluvial channel

Subwatershed	Valley Segment or Geomorphic Reach	Relative Geomorphic Potential For Change	Existing Channel Description
Lower Yankee Fork (Table 6, Plates 4, 5 & 6)	Bonanza Area (RM 9.15-6.8)	High	Predominantly a moderately confined, free-formed alluvial channel
	Pole Flat Area (RM 6.8-3.1)	High	Moderately confined, free-formed alluvial channel
	Flat Rock Area (RM 3.1-0)	Low	Confined, bedrock channel

This document presents the *Yankee Fork Fluvial Habitat Rehabilitation Plan, Yankee Fork of the Salmon River, Custer County, Idaho, 2013 Working Version* (Rehabilitation Plan). The Watershed Action Group working in the Yankee Fork watershed is referred to as the Yankee Fork Interdisciplinary Team, and this Interdisciplinary Team recognizes that the rehabilitation efforts underway along the Yankee Fork River will span multiple years and will require a flexible project implementation strategy. This Rehabilitation Plan is a ***working draft*** that will continue to evolve as new information becomes available. The Implementation Plan (Table 3) is a subset of the Rehabilitation Plan and has been recommended by the Yankee Fork Interdisciplinary Team. The Implementation Plan contains both short- and long-term strategies to implement rehabilitation actions scheduled through 2018. This Rehabilitation Plan can change with shifts in priorities, objectives, socioeconomics, and feasibility of project implementation. Potential project areas will need to be further analyzed during project development and may include an alternatives analysis to determine if habitat rehabilitation versus habitat creation is necessary or appropriate for the identified areas or if they should be monitored and maintained without further disturbance.

Table 3. Implementation Plan for 2008-2018.

Project	Priority	Planned Construction	Objective
SHORT-TERM STRATEGY			
Pond Series Three	Tier 3	<i>Completed 2012</i>	Adaptive Management
Pond Series Two	Tier 3	2013	Adaptive Management
Pond Series Four	Tier 3	2017	Adaptive Management
LONG-TERM STRATEGY			
Channel Segment RM 8.35-7.45 (aka Preacher's Cove)	Tier 1	2014	Floodplain Enhancement and Instream Complexity
Channel Segment RM 9.15-8.35 (aka Bonanza City)	Tier 1	2015-2016	Floodplain Enhancement and Instream Complexity
Yankee Fork and West Fork Confluence Area (aka West Fork Confluence Area)	Tier 1	2017	Reconnect Historic Channel and Floodplain Interactions
Jerrys Creek	Tier 1	2019	Tributary Reconnect, Floodplain Enhancement and Instream Complexity

Tables 4 through 6 that describe the Prioritization of Rehabilitation Actions for the Yankee Fork River have been developed using the results from the tributary and reach assessments. These prioritization tables describe: (1) project location, (2) potential rehabilitation actions, focal fish species, and viable salmonid population (VSP) parameters, (3) existing condition metrics, (4) target condition metrics, and (5) limiting factors addressed.

The prioritization tables are arranged from upstream to downstream by subwatersheds which are subdivided into valley segments and/or geomorphic reaches. Bonanza Area, Pole Flat Area, and Custer Area geomorphic reaches have been further divided into channel segments and project areas.

Limiting factors used in the tables are from the list of limiting and causal factors currently used by the Upper Salmon Expert Panel. Based on existing and target conditions, the appropriate limiting factor(s) that would be expected to be addressed by the rehabilitation actions are listed and described. Potential project areas may need to be further analyzed to determine if habitat creation is necessary or appropriate for the identified areas, or if they should be monitored and maintained without further disturbance.

The Tribes have initiated a Research, Monitoring, and Evaluation (RM&E) program that encompass their habitat rehabilitation and fish supplementation programs. Based on the need to monitor the affects of habitat rehabilitation, fish supplementation, and natural fish

production, the Tribes are implementing a RM&E strategy based in part on the Columbia Habitat Monitoring Program (CHaMP). CHaMP monitors fish habitat status and trends throughout the portion of the Columbia and Snake River systems that are accessible to anadromous salmonids or which affect the quality of habitat in those tributary systems inhabited by salmon and steelhead (ISRP 2011). Additionally, information and data is collected by the Integrated Status and Effectiveness Monitoring Program (ISEMP) with an emphasis on monitoring anadromous fish species using a combination of status and trend analyses and experimental habitat manipulation (ISRP 2011).

Table 4. Upper Yankee Fork Prioritization of Rehabilitation Actions.

Project	Priority	Description	Existing Condition Metrics	Target Condition Metrics	Limiting Factors Addressed
Headwaters Valley Segment (Yankee Fork RM 29.80-22.70)					
Headwaters Valley Segment RM 29.8-22.7	Tier 1	<p>Floodplain Enhancement (FE) and Instream Complexity: There are three goals associated with the rehabilitation of this valley segment that include:</p> <ol style="list-style-type: none">1) re-establishing appropriate species composition for floodplain vegetation and improving vegetation vitality2) increasing large woody material recruitment potential and retention3) increasing channel complexity and improving channel geometry <p>Potential Project Considerations Include, But Are Not Limited To, The Following:</p> <ol style="list-style-type: none">1) improve riparian vegetation through silviculture and best management practices (i.e., maintain “no grazing or trailing” along riparian corridors)2) increase large woody material availability to the channel through floodplain loading3) improve channel geometry and increase habitat diversity through “deformable” (or temporary) instream wood placements where appropriate <p>Actions would result in improved floodplain vegetation composition and structure, increased large woody material recruitment potential, and increased channel complexity and aquatic habitat diversity.</p> <p>Focal Species: Bull trout and westslope cutthroat.</p> <p>Viable Salmonid Population (VSP) Parameters Improved: Abundance and productivity, and spatial structure and diversity.</p>	<p>Channel Length Impacted: <i>Existing Yankee Fork Channel:</i> 7.1 RM</p> <p>Channel Confinement: <i>Existing Yankee Fork Channel:</i> Unconfined to moderately confined, free-formed alluvial channel</p> <p>Channel Planform: <i>Existing Yankee Fork Channel:</i> Predominantly straight with short meandering sections</p> <p>Channel Bedform: <i>Existing Yankee Fork Channel:</i> Plane-bed to pool-riffle</p> <p>Dominant Substrate: <i>Existing Yankee Fork Channel:</i> Gravel</p> <p>Riparian Condition: <i>Existing Yankee Fork Channel Buffer:</i> 10-100 feet</p> <p>Large Woody Material Recruitment Potential: <i>Existing Yankee Fork Channel:</i> Moderate</p> <p>Floodplain Connectivity: <i>Existing Yankee Fork Channel:</i> Good</p> <p>Access to Peripheral Habitats: <i>Existing Yankee Fork Channel:</i> Good</p>	<p>Channel Length Impacted: <i>Modified Yankee Fork Channel:</i> Same</p> <p>Channel Confinement: <i>Modified Yankee Fork Channel:</i> Same</p> <p>Channel Planform: <i>Modified Yankee Fork Channel:</i> Same, but with increased channel boundary roughness channel may develop more meanders</p> <p>Channel Bedform: <i>Modified Yankee Fork Channel:</i> Same, but an increase in wood availability and instream roughness may result in more bedform diversity</p> <p>Dominant Substrate: <i>Modified Yankee Fork Channel:</i> Same, but an increase in wood availability and more hydraulic diversity may result in additional gravel sorting and retention and increased bedform diversity</p> <p>Riparian Condition: <i>Modified Yankee Fork Channel Buffer:</i> Same, but improving structure and vitality of riparian vegetation</p> <p>Large Woody Material Recruitment Potential: <i>Modified Yankee Fork Channel:</i> Same, but improving as vegetation progresses through successional stages to maturity</p> <p>Floodplain Connectivity: <i>Modified Yankee Fork Channel:</i> Same, but improving instream and channel boundary roughness should increase floodplain connectivity</p> <p>Access to Peripheral Habitats: <i>Modified Yankee Fork Channel:</i> Same, but as floodplain connectivity and bedform diversity improves, so will the availability of peripheral habitats</p>	<p>4: Riparian Condition</p> <p>4.1: Riparian Condition – loss of large-to-mature trees within the riparian buffer zone that help stabilize streambanks, increase channel boundary roughness, and provide large woody material to the channel.</p> <p>4.2: Large Woody Material Recruitment – loss of available large-to-mature trees for channel recruitment resulting in a decline in channel complexity and aquatic habitat diversity.</p> <p>6: Channel Structure and Form</p> <p>6.1: Bed and Channel Form – increase in channel width-to-depth ratios due to grazing and bank trampling by livestock resulting in channel widening.</p> <p>6.2: Instream Structural Complexity – loss of large woody material available for recruitment by the channel resulting in a net reduction in bedform diversity, flow variability, and aquatic habitat complexity.</p>

Project	Priority	Description	Existing Condition Metrics	Target Condition Metrics	Limiting Factors Addressed
Twelve Mile Area Geomorphic Reach (Yankee Fork RM 22.70-20.40)					
Twelve Mile Area Geomorphic Reach RM 22.7-20.4	Tier 1	<p><u>Floodplain Enhancement and Instream Complexity:</u> There are three goals associated with the rehabilitation of this channel segment that include:</p> <ol style="list-style-type: none">1) re-establishing appropriate species composition for floodplain vegetation and improving vegetation vitality2) increasing large woody material recruitment potential and retention3) increasing channel complexity and improving channel geometry <p><u>Potential Project Considerations Include, But Are Not Limited To, The Following:</u></p> <ol style="list-style-type: none">1) improve riparian vegetation through silviculture and best management practices (i.e., maintain “no grazing or trailing” along riparian corridors)2) increase large woody material availability to the channel through floodplain loading3) improve channel geometry and increase habitat diversity through “deformable” (or temporary) instream wood placements where appropriate <p>Actions would result in improved floodplain vegetation composition and structure, increased large woody material recruitment potential, and increased channel complexity and aquatic habitat diversity.</p> <p><u>Focal Species:</u> Bull trout and westslope cutthroat.</p> <p><u>Viable Salmonid Population (VSP) Parameters Improved:</u> Abundance and productivity, and spatial structure and diversity.</p>	<p><u>Channel Length Impacted:</u> <i>Existing Yankee Fork Channel:</i> 2.3 RM</p> <p><u>Channel Confinement:</u> <i>Existing Yankee Fork Channel:</i> Predominantly a moderately confined, free-formed alluvial channel</p> <p><u>Channel Planform:</u> <i>Existing Yankee Fork Channel:</i> Predominantly straight with short meandering sections</p> <p><u>Channel Bedform:</u> <i>Existing Yankee Fork Channel:</i> Predominantly plane-bed with short pool-riffle sections</p> <p><u>Dominant Substrate:</u> <i>Existing Yankee Fork Channel:</i> Gravel and cobble</p> <p><u>Riparian Condition:</u> <i>Existing Yankee Fork Channel Buffer:</i> 5-90 feet</p> <p><u>Large Woody Material Recruitment Potential:</u> <i>Existing Yankee Fork Channel:</i> Moderate-to-good</p> <p><u>Floodplain Connectivity:</u> <i>Existing Yankee Fork Channel:</i> Good</p> <p><u>Access to Peripheral Habitats:</u> <i>Existing Yankee Fork Channel:</i> Good</p>	<p><u>Channel Length Impacted:</u> <i>Modified Yankee Fork Channel:</i> Same</p> <p><u>Channel Confinement:</u> <i>Modified Yankee Fork Channel:</i> Same</p> <p><u>Channel Planform:</u> <i>Modified Yankee Fork Channel:</i> Same</p> <p><u>Channel Bedform:</u> <i>Modified Yankee Fork Channel:</i> Same, but an increase in wood availability and instream roughness may result in more bedform diversity</p> <p><u>Dominant Substrate:</u> <i>Modified Yankee Fork Channel:</i> Same, but an increase in wood availability and more hydraulic diversity may result in additional gravel sorting and retention and increased bedform diversity</p> <p><u>Riparian Condition:</u> <i>Modified Yankee Fork Channel Buffer:</i> Same, but improving vegetation composition and structure</p> <p><u>Large Woody Material Recruitment Potential:</u> <i>Modified Yankee Fork Channel:</i> Same, but improving as vegetation progresses through successional stages to maturity</p> <p><u>Floodplain Connectivity:</u> <i>Modified Yankee Fork Channel:</i> Same</p> <p><u>Access to Peripheral Habitats:</u> <i>Modified Yankee Fork Channel:</i> Same</p>	<p><u>4: Riparian Condition</u></p> <p>4.1: Riparian Condition – loss of large-to-mature trees within the riparian buffer zone that help stabilize streambanks, increase channel boundary roughness, and provide large woody material to the channel.</p> <p>4.2: Large Woody Material Recruitment – loss of large-to-mature trees available for channel recruitment resulting in a decline in channel complexity and habitat diversity.</p> <p><u>6: Channel Structure and Form</u></p> <p>6.1: Bed and Channel Form – increase in channel width-to-depth ratios due to grazing and bank trampling by livestock resulting in channel widening.</p> <p>6.2: Instream Structural Complexity – loss of large woody material available for recruitment by the channel resulting in a net reduction in bedform diversity, flow variability, and aquatic habitat complexity.</p>

Project	Priority	Description	Existing Condition Metrics	Target Condition Metrics	Limiting Factors Addressed
Nine Mile Area Geomorphic Reach (Yankee Fork RM 20.40-17.70)					
Nine Mile Area Geomorphic Reach RM 20.4-17.7	Tier 1	<p><u>Floodplain Enhancement and Instream Complexity:</u> There are three goals associated with the rehabilitation of this channel segment that include:</p> <ol style="list-style-type: none">1) re-establishing appropriate species composition for floodplain vegetation and improving vegetation vitality2) increasing large woody material recruitment potential and retention3) increasing channel complexity and improving channel geometry <p><u>Potential Project Considerations Include, But Are Not Limited To, The Following:</u></p> <ol style="list-style-type: none">1) improve riparian vegetation through silviculture and best management practices (i.e., maintain “no grazing or trailing” along riparian corridors)2) increase large woody material availability to the channel through floodplain loading3) improve channel geometry and increase habitat diversity through “deformable” (or temporary) instream wood placements where appropriate <p>Actions would result in improved floodplain vegetation composition and structure, increased large woody material recruitment potential, and increased channel complexity and aquatic habitat diversity.</p> <p><u>Focal Species:</u> Bull trout and westslope cutthroat.</p> <p><u>Viable Salmonid Population (VSP) Parameters Improved:</u> Abundance and productivity, and spatial structure and diversity.</p>	<p><u>Channel Length Impacted:</u> <i>Existing Yankee Fork Channel:</i> 2.70 RM</p> <p><u>Channel Confinement:</u> <i>Existing Yankee Fork Channel:</i> Predominantly a moderately confined, free-formed alluvial channel</p> <p><u>Channel Planform:</u> <i>Existing Yankee Fork Channel:</i> Predominantly straight with short meandering sections</p> <p><u>Channel Bedform:</u> <i>Existing Yankee Fork Channel:</i> Predominantly plane-bed with short pool-riffle sections</p> <p><u>Dominant Substrate:</u> <i>Existing Yankee Fork Channel:</i> Gravel and cobble</p> <p><u>Riparian Condition:</u> <i>Existing Yankee Fork Channel Buffer:</i> 5-240 feet</p> <p><u>Large Woody Material Recruitment Potential:</u> <i>Existing Yankee Fork Channel:</i> Moderate to good</p> <p><u>Floodplain Connectivity:</u> <i>Existing Yankee Fork Channel:</i> Moderate to good</p> <p><u>Access to Peripheral Habitats:</u> <i>Existing Yankee Fork Channel:</i> Moderate</p>	<p><u>Channel Length Impacted:</u> <i>Modified Yankee Fork Channel:</i> Same</p> <p><u>Channel Confinement:</u> <i>Modified Yankee Fork Channel:</i> Same</p> <p><u>Channel Planform:</u> <i>Modified Yankee Fork Channel:</i> Same</p> <p><u>Channel Bedform:</u> <i>Modified Yankee Fork Channel:</i> Same, but an increase in wood availability and instream roughness may result in more bedform diversity</p> <p><u>Dominant Substrate:</u> <i>Modified Yankee Fork Channel:</i> Same, but an increase in wood availability and more hydraulic diversity may result in additional gravel sorting and retention and increased bedform diversity</p> <p><u>Riparian Condition:</u> <i>Modified Yankee Fork Channel Buffer:</i> Same, but with improving composition and structure</p> <p><u>Large Woody Material Recruitment Potential:</u> <i>Modified Yankee Fork Channel:</i> Same, but improving as vegetation progresses through successional stages to maturity</p> <p><u>Floodplain Connectivity:</u> <i>Modified Yankee Fork Channel:</i> Same, but improving instream and channel boundary roughness should increase floodplain connectivity</p> <p><u>Access to Peripheral Habitats:</u> <i>Modified Yankee Fork Channel:</i> Same, but as floodplain connectivity and bedform diversity improves, so will the availability of peripheral habitats</p>	<p><u>4: Riparian Condition</u></p> <p>4.1: Riparian Condition – loss of large-to-mature trees within the riparian buffer zone that help stabilize streambanks, increase channel boundary roughness, and provide large woody material to the channel.</p> <p>4.2: Large Woody Material Recruitment – loss of available large-to-mature trees for channel recruitment resulting in a decline in channel complexity and aquatic habitat diversity.</p> <p><u>6: Channel Structure and Form</u></p> <p>6.1: Bed and Channel Form – increase in channel width-to-depth ratios due to grazing and bank trampling by livestock resulting in channel widening.</p> <p>6.2: Instream Structural Complexity – loss of large woody material available for recruitment by the channel resulting in a net reduction in bedform diversity, flow variability, and aquatic habitat complexity.</p>

Project	Priority	Description	Existing Condition Metrics	Target Condition Metrics	Limiting Factors Addressed
Eight Mile Area Geomorphic Reach (Yankee Fork RM 17.70-16.30)					
Eight Mile Area Geomorphic Reach RM 17.7-16.3	Tier 1	<p><u>Floodplain Enhancement and Instream Complexity:</u> There are three goals associated with the rehabilitation of this channel segment that include:</p> <ol style="list-style-type: none">1) re-establishing appropriate species composition for floodplain vegetation and improving vegetation vitality2) increasing large woody material recruitment potential and retention3) increasing channel complexity and improving channel geometry <p><u>Potential Project Considerations Include, But Are Not Limited To, The Following:</u></p> <ol style="list-style-type: none">1) improve riparian vegetation through silviculture and best management practices (i.e., maintain “no grazing or trailing” along riparian corridors)2) increase large woody material availability to the channel through floodplain loading3) improve channel geometry and increase habitat diversity through “deformable” (or temporary) instream wood placements where appropriate <p>Actions would result in improved floodplain vegetation composition and structure, increased large woody material recruitment potential, and increased channel complexity and aquatic habitat diversity.</p> <p><u>Focal Species:</u> Chinook salmon, steelhead, bull trout, and westslope cutthroat.</p> <p><u>Viable Salmonid Population (VSP) Parameters Improved:</u> Abundance and productivity, and spatial structure and diversity.</p>	<p><u>Channel Length Impacted:</u> <i>Existing Yankee Fork Channel:</i> 1.4 RM</p> <p><u>Channel Confinement:</u> <i>Existing Yankee Fork Channel:</i> Unconfined, free-formed alluvial channel</p> <p><u>Channel Planform:</u> <i>Existing Yankee Fork Channel:</i> Predominantly straight with meandering sections</p> <p><u>Channel Bedform:</u> <i>Existing Yankee Fork Channel:</i> Predominantly plane-bed with pool-riffle and island-braided sections</p> <p><u>Dominant Substrate:</u> <i>Existing Yankee Fork Channel:</i> Gravel</p> <p><u>Riparian Condition:</u> <i>Existing Yankee Fork Channel Buffer:</i> 10-250 feet</p> <p><u>Large Woody Material Recruitment Potential:</u> <i>Existing Yankee Fork Channel:</i> Moderate to good</p> <p><u>Floodplain Connectivity:</u> <i>Existing Yankee Fork Channel:</i> Good</p> <p><u>Access to Peripheral Habitats:</u> <i>Existing Yankee Fork Channel:</i> Good</p>	<p><u>Channel Length Impacted:</u> <i>Modified Yankee Fork Channel:</i> Same</p> <p><u>Channel Confinement:</u> <i>Modified Yankee Fork Channel:</i> Same</p> <p><u>Channel Planform:</u> <i>Modified Yankee Fork Channel:</i> Same</p> <p><u>Channel Bedform:</u> <i>Modified Yankee Fork Channel:</i> Same, but an increase in wood availability and instream roughness may result in more bedform diversity</p> <p><u>Dominant Substrate:</u> <i>Modified Yankee Fork Channel:</i> Same, but an increase in wood availability and more hydraulic diversity may result in additional gravel sorting and retention and increased bedform diversity</p> <p><u>Riparian Condition:</u> <i>Modified Yankee Fork Channel Buffer:</i> Same, but with improving structure and vitality of riparian vegetation</p> <p><u>Large Woody Material Recruitment Potential:</u> <i>Modified Yankee Fork Channel:</i> Same, but improving as vegetation progresses through successional stages to maturity</p> <p><u>Floodplain Connectivity:</u> <i>Modified Yankee Fork Channel:</i> Same, but improving instream and channel boundary roughness should increase floodplain connectivity</p> <p><u>Access to Peripheral Habitats:</u> <i>Modified Yankee Fork Channel:</i> Same, but as floodplain connectivity and bedform diversity improves, so will the availability of peripheral habitats</p>	<p><u>4: Riparian Condition</u></p> <p>4.1: Riparian Condition – loss of large-to-mature trees within the riparian buffer zone that help stabilize streambanks, increase channel boundary roughness, and provide large woody material to the channel.</p> <p>4.2: Large Woody Material Recruitment – loss of available large-to-mature trees for channel recruitment resulting in a decline in channel complexity and aquatic habitat diversity.</p> <p><u>6: Channel Structure and Form</u></p> <p>6.2: Instream Structural Complexity – loss of large woody material available for recruitment by the channel resulting in a net reduction in bedform diversity, flow variability, and aquatic habitat complexity.</p>



Plate 1. Upper Yankee Fork Reaches.

This page intentionally left blank

Table 5. Middle Yankee Fork Prioritization of Rehabilitation Actions.

Project	Priority	Description	Existing Condition Metrics	Target Condition Metrics	Limiting Factors Addressed
Greylock Area Geomorphic Reach (Yankee Fork RM 16.30-13.20)					
Greylock Area Geomorphic Reach RM 16.3-13.2	Tier 1	<p>Floodplain Enhancement and Instream Complexity: There are three goals associated with the rehabilitation of this channel segment that include:</p> <ol style="list-style-type: none">1) re-establishing appropriate species composition for floodplain vegetation and improving vegetation vitality2) increasing large woody material recruitment potential and retention3) increasing channel complexity and improving channel geometry <p>Potential Project Considerations Include, But Are Not Limited To, The Following:</p> <ol style="list-style-type: none">1) improve riparian vegetation through silviculture and best management practices2) increase large woody material availability to the channel through floodplain loading3) improve channel geometry and increase habitat diversity through “deformable” (or temporary) instream wood placements where appropriate <p>Actions would result in improved floodplain vegetation composition and structure, increased large woody material recruitment potential, and increased channel complexity and aquatic habitat diversity.</p> <p>Focal Species: Chinook salmon, steelhead, bull trout, and westslope cutthroat.</p> <p>Viable Salmonid Population (VSP) Parameters Improved: Abundance and productivity, and spatial structure and diversity.</p>	<p>Channel Length Impacted: <i>Existing Yankee Fork Channel:</i> 3.1 RM</p> <p>Channel Confinement: <i>Existing Yankee Fork Channel:</i> Unconfined, free-formed alluvial channel</p> <p>Channel Planform: <i>Existing Yankee Fork Channel:</i> Predominantly a straight to meandering channel</p> <p>Channel Bedform: <i>Existing Yankee Fork Channel:</i> Pool-riffle</p> <p>Dominant Substrate: <i>Existing Yankee Fork Channel:</i> Gravel</p> <p>Riparian Condition: <i>Existing Yankee Fork Channel Buffer:</i> 5-260 feet</p> <p>Large Woody Material Recruitment Potential: <i>Existing Yankee Fork Channel:</i> Moderate</p> <p>Floodplain Connectivity: <i>Existing Yankee Fork Channel:</i> Good</p> <p>Access to Peripheral Habitats: <i>Existing Yankee Fork Channel:</i> Good</p>	<p>Channel Length Impacted: <i>Modified Yankee Fork Channel:</i> Same</p> <p>Channel Confinement: <i>Modified Yankee Fork Channel:</i> Same</p> <p>Channel Planform: <i>Modified Yankee Fork Channel:</i> Same</p> <p>Channel Bedform: <i>Modified Yankee Fork Channel:</i> Same, but an increase in wood availability and instream roughness may result in more bedform diversity</p> <p>Dominant Substrate: <i>Modified Yankee Fork Channel:</i> Same, but an increase in wood availability and more hydraulic diversity may result in additional gravel sorting and retention and increased bedform diversity</p> <p>Riparian Condition: <i>Modified Yankee Fork Channel Buffer:</i> Same, but improving structure and vitality of riparian vegetation</p> <p>Large Woody Material Recruitment Potential: <i>Modified Yankee Fork Channel:</i> Same, but improving as vegetation progresses through successional stages to maturity</p> <p>Floodplain Connectivity: <i>Modified Yankee Fork Channel:</i> Same, but improving instream and channel boundary roughness should increase floodplain connectivity</p> <p>Access to Peripheral Habitats: <i>Modified Yankee Fork Channel:</i> Same, but as floodplain connectivity and bedform diversity improves, so will the availability of peripheral habitats</p>	<p>4: Riparian Condition</p> <p>4.1: Riparian Condition – loss of large-to-mature trees within the riparian buffer zone that help stabilize streambanks, increase channel boundary roughness, and provide large woody material to the channel.</p> <p>4.2: Large Woody Material Recruitment – loss of available large-to-mature trees for channel recruitment resulting in a decline in channel complexity and aquatic habitat diversity.</p> <p>6: Channel Structure and Form</p> <p>6.2: Instream Structural Complexity – loss of large woody material available for recruitment by the channel resulting in a net reduction in bedform diversity, flow variability, and aquatic habitat complexity.</p>

Project	Priority	Description	Existing Condition Metrics	Target Condition Metrics	Limiting Factors Addressed
Canyon Area Geomorphic Reach (Yankee Fork RM 13.20-11.25)					
Canyon Area Geomorphic Reach RM 13.2-11.25	Tier 1	<p>Monitor and Maintain: Protecting the highly functioning habitats through this migratory corridor while maintaining or improving water quantity and quality. Where possible, wood could be incorporated into the system to provide cover and channel complexity.</p> <p>Focal Species: Chinook salmon, steelhead, bull trout, and westslope cutthroat.</p> <p>Viable Salmonid Population (VSP) Parameters Maintained: Abundance and productivity, and spatial structure and diversity.</p>	<p>Channel Length Impacted: <i>Existing Yankee Fork Channel:</i> 1.95 RM</p> <p>Channel Confinement: <i>Existing Yankee Fork Channel:</i> Confined, bedrock channel</p> <p>Channel Planform: <i>Existing Yankee Fork Channel:</i> Straight channel</p> <p>Channel Bedform: <i>Existing Yankee Fork Channel:</i> Step-pool</p> <p>Dominant Substrate: <i>Existing Yankee Fork Channel:</i> Bedrock</p> <p>Riparian Condition: <i>Existing Yankee Fork Channel Buffer:</i> 5-30 feet</p> <p>Large Woody Material Recruitment Potential: <i>Existing Yankee Fork Channel:</i> Moderate</p> <p>Floodplain Connectivity: <i>Existing Yankee Fork Channel:</i> Good</p> <p>Access to Peripheral Habitats: <i>Existing Yankee Fork Channel:</i> Good</p>	<p>Channel Length Impacted: <i>Modified Yankee Fork Channel:</i> Same</p> <p>Channel Confinement: <i>Modified Yankee Fork Channel:</i> Same</p> <p>Channel Planform: <i>Modified Yankee Fork Channel:</i> Same</p> <p>Channel Bedform: <i>Modified Yankee Fork Channel:</i> Same</p> <p>Dominant Substrate: <i>Modified Yankee Fork Channel:</i> Same</p> <p>Riparian Condition: <i>Modified Yankee Fork Channel Buffer:</i> Same</p> <p>Large Woody Material Recruitment Potential: <i>Modified Yankee Fork Channel:</i> Same</p> <p>Floodplain Connectivity: <i>Modified Yankee Fork Channel:</i> Same</p> <p>Access to Peripheral Habitats: <i>Modified Yankee Fork Channel:</i> Same</p>	<p>In general, no limiting factors are anticipated to be addressed unless wood is added to the system which would then address the following:</p> <p>4: Riparian Condition</p> <p>4.2: Large Woody Material Recruitment – loss of available large-to-mature trees for channel recruitment resulting in a decline in channel complexity and aquatic habitat diversity.</p> <p>6: Channel Structure and Form</p> <p>6.2: Instream Structural Complexity – loss of large woody material available for recruitment by the channel resulting in a net reduction in bedform diversity, flow variability, and aquatic habitat complexity.</p>

Project	Priority	Description	Existing Condition Metrics	Target Condition Metrics	Limiting Factors Addressed
Custer Area Geomorphic Reach (Yankee Fork RM 11.25-9.15)					
Custer Area Channel Segment RM 11.25-10.3	Tier 1	<p><u>Floodplain Enhancement and Instream Complexity:</u> There are three goals associated with the rehabilitation of this channel segment that include:</p> <ol style="list-style-type: none">insuring that habitat rehabilitation actions consider the preservation of the town of Custer and do not result in loss of historic landmarks or artifactsimproving channel and floodplain interactionsincreasing channel complexity and improving channel geometry. <p><u>Potential Project Considerations Include, But Are Not Limited To, The Following:</u> Project Area FE-YF11.15-RL:</p> <ol style="list-style-type: none">improve connectivity of an existing overflow channelplace a wood structure downstream of overflow channel inletplace wood structures along streambank and overflow channelplant appropriate vegetation in cleared and disturbed areas <p>Actions would result in improved floodplain connectivity, about 400 feet of peripheral habitats, and increased channel boundary roughness. Rehabilitated floodplain patch size would be about 0.9 acres.</p> <p>Project Area FE-YF10.8-RL:</p> <ol style="list-style-type: none">create a larger floodplain patch by relocating or modifying bridge and removing left embankmentplant appropriate vegetation in disturbed areathen maintain and monitor floodplain vegetation <p>Actions would result in improved floodplain connectivity and increased channel boundary roughness. Rehabilitated floodplain patch size would be about 1.4 acres.</p> <p>Project Area FE-YF10.7-RR:</p> <ol style="list-style-type: none">increase floodplain boundary roughness by placing wood structures and bioengineeringplant appropriate vegetation in cleared and disturbed areas to maintain a riparian buffer zone <p>Actions would result in improved floodplain and floodplain boundary roughness, thereby reducing the likelihood of the channel migrating laterally toward the historic town of Custer in the near future. Rehabilitated floodplain patch size would be about 1.2 acres.</p> <p>Project Area FE-YF10.65-RL: Maintain and monitor existing conditions. Actions implemented upstream of project area may result in an increase in floodplain connectivity, and additional wood loading may be needed if erosion starts to occur at an unnatural rate. Floodplain patch size is about 0.4 acres.</p> <p>Project Area FE-YF10.45-RL: Maintain and monitor existing conditions. Actions implemented upstream of project area may result in an increase in floodplain connectivity, and additional wood loading may be needed if erosion starts to occur at an unnatural rate. Floodplain patch size is about 0.4 acres.</p> <p><u>Focal Species:</u> Chinook salmon, steelhead, bull trout, and westslope cutthroat.</p> <p><u>Viable Salmonid Population (VSP) Parameters Improved:</u> Abundance and productivity.</p>	<p><u>Channel Length Impacted:</u> <i>Existing Yankee Fork Channel:</i> 0.95 RM</p> <p><u>Channel Confinement:</u> <i>Existing Yankee Fork Channel:</i> Predominantly a moderately confined, free-formed alluvial channel</p> <p><u>Channel Planform:</u> <i>Existing Yankee Fork Channel:</i> Predominantly a straight channel</p> <p><u>Channel Bedform:</u> <i>Existing Yankee Fork Channel:</i> Plane-bed</p> <p><u>Dominant Substrate:</u> <i>Existing Yankee Fork Channel:</i> Cobble and gravel</p> <p><u>Riparian Condition:</u> <i>Existing Yankee Fork Channel Buffer:</i> <5-120 feet</p> <p><u>Large Woody Material Recruitment Potential:</u> <i>Existing Yankee Fork Channel:</i> Moderate</p> <p><u>Floodplain Connectivity:</u> <i>Existing Yankee Fork Channel:</i> Moderate</p> <p><u>Access to Peripheral Habitats:</u> <i>Existing Yankee Fork Channel:</i> Moderate</p>	<p><u>Channel Length Impacted:</u> <i>Modified Yankee Fork Channel:</i> Same</p> <p><u>Channel Confinement:</u> <i>Modified Yankee Fork Channel:</i> Same</p> <p><u>Channel Planform:</u> <i>Modified Yankee Fork Channel:</i> Same, but with increased channel boundary roughness channel may develop more meanders</p> <p><u>Channel Bedform:</u> <i>Modified Yankee Fork Channel:</i> Same, but an increase in wood availability and instream roughness may result in more bedform diversity</p> <p><u>Dominant Substrate:</u> <i>Modified Yankee Fork Channel:</i> Same, but an increase in wood availability and more hydraulic diversity may result in additional gravel sorting and retention and increased bedform diversity</p> <p><u>Riparian Condition:</u> <i>Modified Yankee Fork Channel Buffer:</i> Increase riparian buffer zone to 30-120 feet</p> <p><u>Large Woody Material Recruitment Potential:</u> <i>Modified Yankee Fork Channel:</i> Same, but improving as vegetation progresses through successional stages to maturity</p> <p><u>Floodplain Connectivity:</u> <i>Modified Yankee Fork Channel:</i> Good, improving instream and channel boundary roughness should increase floodplain connectivity</p> <p><u>Access to Peripheral Habitats:</u> <i>Modified Yankee Fork Channel:</i> Good, as floodplain connectivity and bedform diversity improves, so will the availability of peripheral habitats</p>	<p><u>4: Riparian Condition</u></p> <p>4.1: Riparian Condition – loss of large-to-mature trees and riparian vegetation, decline in organic matter inputs, fish cover, and natural shade.</p> <p>4.2: Large Woody Material Recruitment – loss of available large-to-mature trees for channel recruitment resulting in a decline in channel complexity and aquatic habitat diversity.</p> <p><u>5: Peripheral and Transitional Habitats</u></p> <p>5.2: Floodplain Condition – decline in access to the over or beyond bank habitats that were periodically inundated during high flows.</p> <p><u>6: Channel Structure and Form</u></p> <p>6.1: Bed and Channel Form – loss of streambank stability due to riparian vegetation clearing resulting in localized increases in width-to-depth ratios or channel widening.</p> <p>6.2: Instream Structural Complexity – loss of large woody material available for recruitment by the channel resulting in a net reduction in bedform diversity, flow variability, and aquatic habitat complexity.</p> <p><u>7: Sediment Conditions</u></p> <p>7.1: Decreased Sediment Quantity – decline in channel boundary roughness and instream complexity has led to an increase in sediment transport capacity resulting in a decline in gravel sorting and retention.</p>

Project	Priority	Description	Existing Condition Metrics	Target Condition Metrics	Limiting Factors Addressed
Custer Area Channel Segment RM 10.3-9.15	Tier 1	<p>Floodplain Enhancement and Instream Complexity: There are two goals associated with the rehabilitation of this channel segment that include:</p> <ol style="list-style-type: none">1) improving channel and floodplain interactions2) increasing channel complexity and improving channel geometry <p>Potential Project Considerations Include, But Are Not Limited To, The Following: Project Area FE-YF10.25-RR:</p> <ol style="list-style-type: none">1) create a larger floodplain patch by regrading embankments and/or spoil piles (waste material) near upstream end of project area2) decommission access road and ford near downstream end of project area3) place wood structures along streambank4) plant appropriate vegetation in cleared and disturbed area <p>Actions would result in improved floodplain connectivity and increased channel boundary roughness. Rehabilitated floodplain patch size would be about 0.9 acres.</p> <p>Project Area FE-YF10.2-Island:</p> <ol style="list-style-type: none">1) decommission access road across island and fords across the channels between project areas FE-YF10.25-RR and FE_YF10.15-RL2) construct apex logjam at head of island to maintain split flows3) place wood structures along streambank4) plant appropriate vegetation in cleared and disturbed areas <p>Actions would result in improved channel geometries, increased channel boundary roughness, and maintaining split flows. Rehabilitated floodplain patch size would be about 0.4 acres.</p> <p>Project Area FE-YF10.15-RL:</p> <ol style="list-style-type: none">1) create a larger floodplain patch by regrading and/or removing embankments and mine tailings2) decommission access road and ford near middle of project area3) place wood structures downstream of overflow channel inlets to force flow divergence and increase flows into channels4) place wood structures along streambank and overflow channels5) plant appropriate vegetation in cleared and disturbed areas <p>Actions would result in improved floodplain connectivity and increased channel boundary roughness. Rehabilitated floodplain patch size would be about 5.3 acres.</p> <p>Project Area FE-YF10-RR:</p> <ol style="list-style-type: none">1) improve floodplain vegetation species composition and vitality at upstream extent of the project area2) stabilize streambanks and re-establish riparian buffer zones at undeveloped camp sites adjacent to the river by using wood placements and bioengineering techniques3) plant appropriate vegetation in cleared and disturbed area <p>Actions would result in improved floodplain vegetation composition and vitality, increased channel boundary roughness, and reduction in fine sediment inputs to the channel. Rehabilitated floodplain patch size would be about 4.8 acres.</p> <p>Project Area FE-YF9.9-RL: Maintain and monitor existing conditions. Actions implemented upstream of project area may result in an increase in floodplain connectivity and additional wood loading may be needed if erosion starts to occur at an unnatural rate. Floodplain patch size is about 0.9 acres.</p>	<p>Channel Length Impacted: <i>Existing Yankee Fork Channel:</i> 1.15 RM</p> <p>Channel Confinement: <i>Existing Yankee Fork Channel:</i> Predominantly a moderately confined, free-formed alluvial channel</p> <p>Channel Planform: <i>Existing Yankee Fork Channel:</i> Predominantly a straight channel</p> <p>Channel Bedform: <i>Existing Yankee Fork Channel:</i> Plane-bed</p> <p>Dominant Substrate: <i>Existing Yankee Fork Channel:</i> Gravel and cobble</p> <p>Riparian Condition: <i>Existing Yankee Fork Channel Buffer:</i> <5-260 feet</p> <p>Large Woody Material Recruitment Potential: <i>Existing Yankee Fork Channel:</i> Moderate</p> <p>Floodplain Connectivity: <i>Existing Yankee Fork Channel:</i> Moderate</p> <p>Access to Peripheral Habitats: <i>Existing Yankee Fork Channel:</i> Moderate</p>	<p>Channel Length Impacted: <i>Modified Yankee Fork Channel:</i> Same</p> <p>Channel Confinement: <i>Modified Yankee Fork Channel:</i> Same</p> <p>Channel Planform: <i>Modified Yankee Fork Channel:</i> Same</p> <p>Channel Bedform: <i>Modified Yankee Fork Channel:</i> Same, but with increased channel boundary roughness channel may develop more meanders</p> <p>Dominant Substrate: <i>Modified Yankee Fork Channel:</i> Same, but an increase in wood availability and more hydraulic diversity may result in additional gravel sorting and retention and increased bedform diversity</p> <p>Riparian Condition: <i>Modified Yankee Fork Channel Buffer:</i> Increase riparian buffer zone to 30-260 feet</p> <p>Large Woody Material Recruitment Potential: <i>Modified Yankee Fork Channel:</i> Same, but improving as vegetation progresses through successional stages to maturity</p> <p>Floodplain Connectivity: <i>Modified Yankee Fork Channel:</i> Good, improving instream and channel boundary roughness should increase floodplain connectivity</p> <p>Access to Peripheral Habitats: <i>Modified Yankee Fork Channel:</i> Good, as floodplain connectivity and bedform diversity improves, so will the availability of peripheral habitats</p>	<p>4: Riparian Condition</p> <p>4.1: Riparian Condition – loss of large-to-mature trees and riparian vegetation, decline in organic matter inputs, fish cover, and natural shade.</p> <p>4.2: Large Woody Material Recruitment – loss of available large-to-mature trees for channel recruitment resulting in a decline in channel complexity and aquatic habitat diversity.</p> <p>5: Peripheral and Transitional Habitats</p> <p>5.2: Floodplain Condition – decline in access to the over or beyond bank habitats that were periodically inundated during high flows.</p> <p>6: Channel Structure and Form</p> <p>6.1: Bed and Channel Form – loss of streambank stability due to riparian vegetation clearing resulting in localized increases in width-to-depth ratios or channel widening.</p> <p>6.2: Instream Structural Complexity – loss of large woody material available for recruitment by the channel resulting in a net reduction in bedform diversity, flow variability, and aquatic habitat complexity.</p> <p>7: Sediment Conditions</p> <p>7.1: Decreased Sediment Quantity – decline in channel boundary roughness and instream complexity has led to an increase in sediment transport capacity resulting in a decline in gravel sorting and retentions.</p>

Project	Priority	Description	Existing Condition Metrics	Target Condition Metrics	Limiting Factors Addressed
		<p>Project Area FE-YF9.65-RL:</p> <ol style="list-style-type: none">1) create a larger floodplain patch by regrading and/or removing embankments and mine tailings near the downstream end of project area2) consider placing a constructed riffle near RM 9.7 to improve floodplain connectivity3) place wood structures downstream of overflow channel inlets to create flow divergence and increase flows into channels4) place wood structures along overflow channels and streambank5) plant appropriate vegetation in cleared and disturbed areas <p>Actions would result in improved floodplain connectivity and increased channel boundary roughness. Rehabilitated floodplain patch size would be about 5.5 acres.</p> <p>Project Area FE-YF9.45-RR:</p> <ol style="list-style-type: none">1) improve floodplain vegetation species composition and vitality at upstream extent of the project area2) stabilize streambanks and re-establish riparian buffer zones at undeveloped camp sites adjacent to the river by using wood placements and bioengineering techniques3) plant appropriate vegetation in cleared and disturbed area <p>Actions would result in improved floodplain vegetation composition and vitality, increased channel boundary roughness, and reduction in fine sediment inputs to the channel. Rehabilitated floodplain patch size would be about 3.8 acres.</p> <p>Project Area FE-YF9.35-RL:</p> <ol style="list-style-type: none">1) improve floodplain vegetation species composition and vitality along most of the project area2) consider placing a constructed riffle near RM 9.35 to improve floodplain connectivity3) plant appropriate vegetation in cleared and disturbed area <p>Actions would result in improved floodplain vegetation composition and vitality, and increased floodplain connectivity. Rehabilitated floodplain patch size would be about 3.2 acres.</p> <p>Focal Species: Chinook salmon, steelhead, bull trout, and westslope cutthroat.</p> <p>Viable Salmonid Population (VSP) Parameters Improved: Abundance and productivity.</p>			

This page intentionally left blank

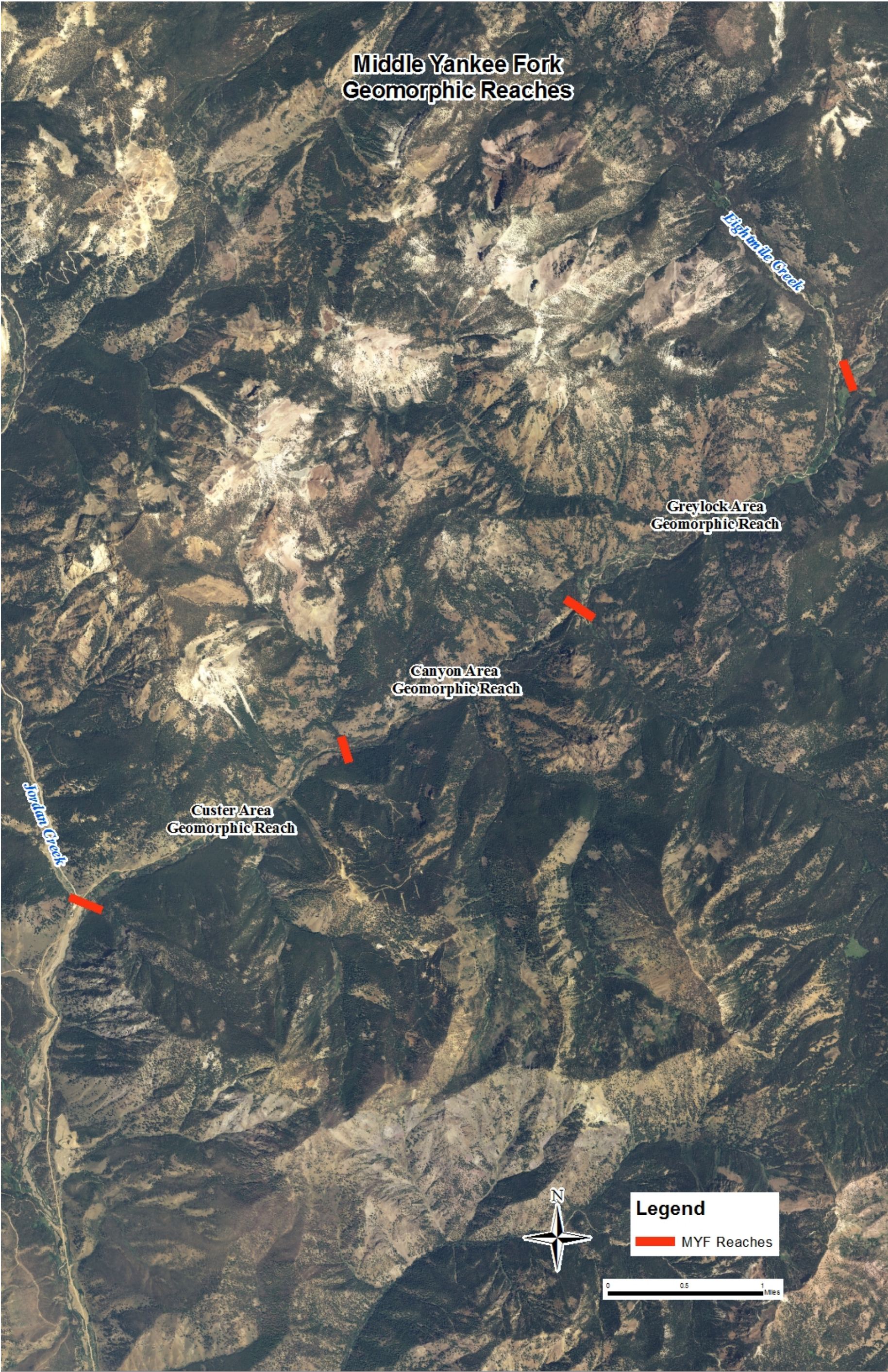


Plate 2. Middle Yankee Fork Reaches.

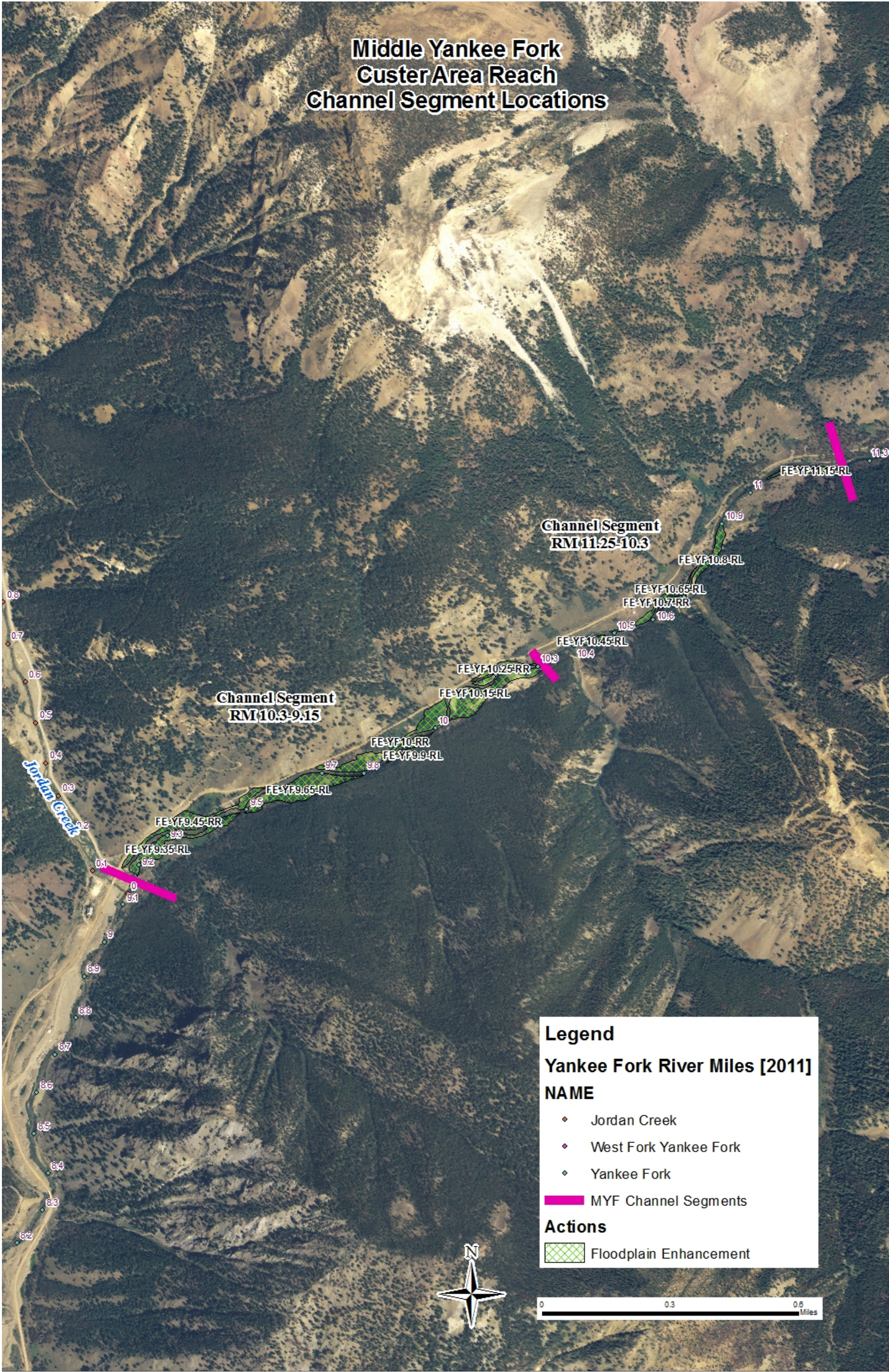


Plate 3. Custer Area Reach Channel Segment Locations.

Table 6. Lower Yankee Fork Prioritization of Rehabilitation Actions.

Project	Priority	Description	Existing Condition Metrics	Target Condition Metrics	Limiting Factors Addressed
Bonanza Area Geomorphic Reach (Yankee Fork RM 9.15-6.80)					
Bonanza Area Yankee Fork/West Fork Confluence	Tier 1	<p>Reconnect Historic Channel and Floodplain Interactions: There are four primary alternatives that need to be evaluated to improve habitat-forming processes that create and maintain habitat variability and diversity which include the following:</p> <ol style="list-style-type: none"> the “no action” alternative which maintains the status quo modifying the existing Yankee Fork channel to improve channel complexity and fish cover full reconnection of Yankee Fork channel to its historic channel and floodplain to reestablish dynamic channel-floodplain interactions split-flow reconnection of Yankee Fork to its historic channel and floodplain while still maintaining some flows in the existing channel to maintain fish habitat in existing channel and, to reconnect and establish dynamic channel-floodplain interactions that historically occurred <p>Potential Project Considerations Include, But Are Not Limited To, The Following: The following are potential rehabilitation actions and other project considerations that should be addressed in order to maximize channel-floodplain dynamics and habitat diversity for the focal fish species:</p> <ol style="list-style-type: none"> which of the alternatives listed above provide the most quantity and highest quality fish habitat, and incorporates dynamic habitat-forming processes depending on the preferred alternative, how much of the dredge tailings (area) will need to be removed, regarded, and/or reused to create the desired conditions where and how much wood should be placed to increase channel and floodplain complexity what is the appropriate vegetation that should be planted in disturbed areas with a preference to reestablishing a cottonwood gallery <p>Focal Species: Chinook salmon, steelhead, bull trout, and westslope cutthroat.</p> <p>Viable Salmonid Population (VSP) Parameters Improved: Abundance and productivity, and spatial structure and diversity.</p>	<p>Channel Length Impacted: <i>Existing Yankee Fork Channel (RM 7.45-6.8):</i> 0.65 RM <i>Existing West Fork Channel (RM 0-0.45):</i> 0.45 RM</p> <p>Channel Confinement: <i>Existing Yankee Fork Channel:</i> RM 7.4-6.8: Moderately confined, free-formed alluvial channel <i>Existing West Fork Channel:</i> RM 0.45-0.2: Unconfined, free-formed alluvial channel RM 0.2-0: Confined, free-formed alluvial channel</p> <p>Channel Planform: <i>Existing Yankee Fork Channel:</i> Straight channel <i>Existing West Fork Channel:</i> Predominantly a straight channel</p> <p>Channel Bedform: <i>Existing Yankee Fork Channel:</i> Plane-bed <i>Existing West Fork Channel:</i> Predominantly plane-bed with short pool-riffle sections</p> <p>Dominant Substrate: <i>Existing Yankee Fork Channel:</i> Cobble and gravel <i>Existing West Fork Channel:</i> Cobble</p>	<p>Channel Length Impacted: <i>Existing Yankee Fork Channel:</i> 0.65 RM <i>Reconnected Yankee Fork Channel:</i> 0.20 RM <i>Existing West Fork Channel:</i> 0.45 RM</p> <p>Channel Confinement: <i>Existing Yankee Fork Channel:</i> RM 7.4-6.8: Moderately confined, free-formed alluvial channel <i>Reconnected Yankee Fork Channel:</i> RM 7.4-West Fork Confluence: Unconfined, free-formed alluvial channel <i>Existing West Fork Channel:</i> RM 0.45-0.2: Same RM 0.2-0: Same</p> <p>Channel Planform: <i>Existing Yankee Fork Channel:</i> Same <i>Reconnected Yankee Fork Channel:</i> Straight <i>Existing West Fork Channel:</i> Same</p> <p>Channel Bedform: <i>Existing Yankee Fork Channel:</i> Same <i>Reconnected Yankee Fork Channel:</i> Predominantly pool-riffle with plane-bed sections <i>Existing West Fork Channel:</i> Same</p> <p>Dominant Substrate: <i>Existing Yankee Fork Channel:</i> Gravel and cobble <i>Reconnected Yankee Fork Channel:</i> Gravel and cobble <i>Existing West Fork Channel:</i> Same</p>	<p>1: Habitat Quantity 1.1: Anthropogenic Barriers – dredge tailing mounds block access to historical channel and floodplain areas (historic confluence area) resulting in the loss of dynamic hydraulic interactions between the Yankee Fork and West Fork.</p> <p>4: Riparian Condition 4.1: Riparian Condition – loss of organic matter, riparian vegetation, large woody material, fish cover, and natural shade due to dredge tailing mounds blocking access to historic confluence area and limiting riparian buffer width.</p> <p>4.2: Large Woody Material Recruitment – loss of mature riparian vegetation and mature trees available for channel recruitment resulting in a decline in habitat complexity.</p> <p>5: Peripheral and Transitional Habitats 5.1: Side Channel and Wetland Conditions – loss of mainstem channel interactions with side channels, wetlands, and other peripheral habitats.</p> <p>5.2: Floodplain Condition – loss of access to the over or beyond bank habitat that was periodically inundated during high flows.</p> <p>6: Channel Structure and Form 6.1: Bed and Channel Form – loss of channel sinuosity, bedform roughness and diversity, and substrate sorting and gravel retention.</p> <p>6.2: Instream Structural Complexity – loss of riparian buffer zone and large woody material leading to declines in channel boundary and instream roughness, resulting in reductions in bedform diversity, habitat complexity, and instream variability.</p> <p>7: Sediment Conditions 7.1: Decreased Sediment Quantity – loss of access to spawning habitats where a diversity of gravel sizes are sorted and retained.</p>

Project	Priority	Description	Existing Condition Metrics	Target Condition Metrics	Limiting Factors Addressed
			<p><u>Riparian Condition:</u> <i>Existing Yankee Fork Channel Buffer:</i> 10-80 ft <i>Existing West Fork Channel Buffer:</i> 15-300 ft</p> <p><u>Large Woody Material Recruitment Potential:</u> <i>Existing Yankee Fork Channel:</i> Poor <i>Existing West Fork Channel:</i> Moderate</p> <p><u>Floodplain Connectivity:</u> <i>Existing Yankee Fork Channel:</i> Moderate <i>Existing West Fork Channel:</i> Moderate to good</p> <p><u>Access to Peripheral Habitats:</u> <i>Existing Yankee Fork Channel:</i> Moderate <i>Existing West Fork Channel:</i> Moderate to good</p>	<p><u>Riparian Condition:</u> <i>Existing Yankee Fork Channel Buffer:</i> 10-80 ft <i>Reconnected Yankee Fork Channel Buffer:</i> 50-270 ft <i>Existing West Fork Channel Buffer:</i> 15-300 ft</p> <p><u>Large Woody Material Recruitment Potential:</u> <i>Existing Yankee Fork Channel:</i> Moderate <i>Reconnected Yankee Fork Channel:</i> Moderate <i>Existing West Fork Channel:</i> Moderate</p> <p><u>Floodplain Connectivity:</u> <i>Existing Yankee Fork Channel:</i> Same <i>Reconnected Yankee Fork Channel:</i> Good <i>Existing West Fork Channel:</i> Same</p> <p><u>Access to Peripheral Habitats:</u> <i>Existing Yankee Fork Channel:</i> Same <i>Reconnected Yankee Fork Channel:</i> Good <i>Existing West Fork Channel:</i> Same</p>	
Bonanza Area Channel Segment RM 9.15-8.35	Tier 1	<p><u>Floodplain Enhancement and Instream Complexity:</u> There are two goals associated with the rehabilitation of this channel segment that include:</p> <ol style="list-style-type: none">1) re-establishing channel and floodplain interactions2) increasing channel complexity and improving channel geometry <p><u>Potential Project Considerations Include, But Are Not Limited To, The Following:</u> Project Area FE-YF9.15-RL:</p> <ol style="list-style-type: none">1) regrade embankment to create a larger floodplain patch2) construct intermittent overflow channels across from mouth of Jordan Creek that coalesce into a floodplain-type side channel along the valley wall3) consider placement of additional wood structures along streambank and side channel4) load floodplain with wood material5) plant disturbance area with appropriate vegetation <p>Actions would result in improved floodplain connectivity, and increased channel boundary and floodplain roughness. Rehabilitated floodplain patch size would be about 0.3 acres.</p> <p>Project Area FE-YF9.05-RR:</p> <ol style="list-style-type: none">1) remove the parking lot fill to create a larger floodplain patch2) consider placement of additional wood structures along streambank and on floodplain3) plant cleared and disturbed areas with appropriate vegetation	<p><u>Channel Length Impacted:</u> <i>Existing Yankee Fork Channel:</i> 0..8 RM</p> <p><u>Channel Confinement:</u> <i>Existing Yankee Fork Channel:</i> Moderately confined, free-formed alluvial channel</p> <p><u>Channel Planform:</u> <i>Existing Yankee Fork Channel:</i> Straight</p> <p><u>Channel Bedform:</u> <i>Existing Yankee Fork Channel:</i> Plane-bed</p> <p><u>Dominant Substrate:</u> <i>Existing Yankee Fork Channel:</i> Cobble</p>	<p><u>Channel Length Impacted:</u> <i>Modified Yankee Fork Channel:</i> Same</p> <p><u>Channel Confinement:</u> <i>Modified Yankee Fork Channel:</i> Unconfined, free-formed alluvial channel</p> <p><u>Channel Planform:</u> <i>Modified Yankee Fork Channel:</i> Straight with short meandering sections</p> <p><u>Channel Bedform:</u> <i>Modified Yankee Fork Channel:</i> Same, but an increase in wood availability and instream roughness may result in more bedform diversity</p> <p><u>Dominant Substrate:</u> <i>Modified Yankee Fork Channel:</i> Gravel and cobble</p>	<p><u>4: Riparian Condition</u></p> <p>4.1: Riparian Condition – loss of organic matter, riparian vegetation, large woody material, fish cover, and natural shade.</p> <p>4.2: Large Woody Material Recruitment – loss of mature riparian vegetation and mature trees available for channel recruitment resulting in a decline in habitat complexity.</p> <p><u>5: Peripheral and Transitional Habitats</u></p> <p>5.1: Side Channel and Wetland Conditions – loss of mainstem channel interactions with side channels, wetlands, and other peripheral habitats.</p> <p>5.2: Floodplain Condition – loss of access to the over or beyond bank habitat that was periodically inundated during high flows.</p>

Project	Priority	Description	Existing Condition Metrics	Target Condition Metrics	Limiting Factors Addressed
		<p>Actions would result in improved floodplain connectivity, and increased channel boundary and floodplain roughness. Rehabilitated floodplain patch size would be 0.8 acres.</p> <p>Project Area FE-YF9.0-RL:</p> <ol style="list-style-type: none">consider leaving the spoil piles in-place as a topographic high and place an apex log jam about 135 feet upstream to force flow divergenceconsider placement of additional wood structures along streambank and on floodplainplant cleared and disturbed areas with appropriate vegetation <p>Actions would result in flood flow divergence around apex log jam that would contribute to the evolution of a side channel along the valley margin, and increased channel boundary and floodplain roughness. Rehabilitated floodplain patch size would be about 0.5 acres.</p> <p>Project Area FE-YF8.9-RL:</p> <ol style="list-style-type: none">construct inlet to overflow channelplace wood structure downstream of inlet to force flow divergence into overflow channelconsider placement of additional wood structures along streambank and overflow channelplant cleared and disturbed areas with appropriate vegetation <p>Actions would result in improved floodplain connectivity, contribute to evolution of overflow channel, and provide channel boundary and floodplain roughness. Rehabilitated floodplain patch size would be about 0.4 acres.</p> <p>Project Area FE-YF8.8-RR:</p> <ol style="list-style-type: none">remove levee to create a larger floodplain patch or island split flow in the mainstemconstruct perennial, floodplain-type side channelsplace wood structures along streambank and side channelsconsider placement of a constructed riffle near RM 8.9load floodplain with wood materialplant appropriate vegetation in cleared and disturbed areas <p>Actions would result in improved floodplain connectivity, about 1200 feet of side channel habitats, and increased channel boundary and floodplain roughness. Rehabilitated floodplain patch size would be about 4.8 acres.</p> <p>Project Area FE-YF8.55-RL:</p> <ol style="list-style-type: none">place an apex log jam on gravel bar directly downstream of overflow channel inletconsider placement of additional wood structures along streambank and overflow channelplant cleared and disturbed areas with appropriate vegetation <p>Actions would result in improved floodplain connectivity, improved flow and evolution of about 450 linear feet of overflow channel, and multiple wood placements that contribute by creating flow divergence, channel boundary roughness, and instream complexity. Rehabilitated floodplain patch size would be about 2.3 acres.</p> <p>Project Area FE-YF8.5-RR:</p> <ol style="list-style-type: none">remove the dredge tailing mounds to create a larger floodplain patchplant disturbance area with appropriate vegetation <p>Actions would result in improved floodplain connectivity and floodplain roughness. Rehabilitated floodplain patch size would be about 0.5 acres.</p>	<p><u>Riparian Condition:</u> <i>Existing Yankee Fork Channel Buffer:</i> 5-90 feet</p> <p><u>Large Woody Material Recruitment Potential:</u> <i>Existing Yankee Fork Channel:</i> Poor</p> <p><u>Floodplain Connectivity:</u> <i>Existing Yankee Fork Channel:</i> Poor to moderate</p> <p><u>Access to Peripheral Habitats:</u> <i>Existing Yankee Fork Channel:</i> Moderate</p>	<p><u>Riparian Condition:</u> <i>Modified Yankee ForkChannel Buffer:</i> 5-200 feet</p> <p><u>Large Woody Material Recruitment Potential:</u> <i>Modified Yankee Fork Channel:</i> Moderate</p> <p><u>Floodplain Connectivity:</u> <i>Modified Yankee Fork Channel:</i> Moderate to good</p> <p><u>Access to Peripheral Habitats:</u> <i>Modified Yankee Fork Channel:</i> Good</p>	<p><u>6: Channel Structure and Form</u></p> <p>6.1: Bed and Channel Form – loss of channel sinuosity, bedform roughness and diversity, and substrate sorting and gravel retention.</p> <p>6.2: Instream Structural Complexity – loss of riparian buffer zone and large woody material leading to declines in channel boundary and instream roughness, resulting in reductions in bedform diversity, habitat complexity, and instream variability.</p> <p><u>7: Sediment Conditions</u></p> <p>7.1: Decreased Sediment Quantity – decline in available spawning habitats due to lack of gravel sorting and retention.</p>

Project	Priority	Description	Existing Condition Metrics	Target Condition Metrics	Limiting Factors Addressed
		Focal Species: Chinook salmon, steelhead, bull trout, and westslope cutthroat. Viable Salmonid Population (VSP) Parameters Improved: Abundance and productivity.			
Bonanza Area Channel Segment RM 8.35-7.45	Tier 1	Floodplain Enhancement and Instream Complexity: There are two goals associated with the rehabilitation of this channel segment that include: <ol style="list-style-type: none">1) re-establishing channel and floodplain interactions2) increasing channel complexity and improving channel geometry. Potential Project Considerations Include, But Are Not Limited To, The Following: Project Area FE-YF8.3-RL: <ol style="list-style-type: none">1) regrade dredge tailings to create a larger floodplain patch2) construct an intermittent, overflow channel3) place wood structure downstream of overflow channel inlet4) consider placement of additional wood structures along streambank and overflow channel5) plant appropriate vegetation in cleared and disturbed areas Actions would result in improved floodplain connectivity, about 275 feet of peripheral habitats, and increased channel boundary and floodplain roughness. Rehabilitated floodplain patch size would be about 0.4 acres. Project Area FE-YF8.25-RR: <ol style="list-style-type: none">1) regrade road embankments and other topographic highs on floodplain to create a larger floodplain patch2) consider placement of additional wood structures along streambank and along existing overflow channel3) plant appropriate vegetation in cleared and disturbed areas Actions would result in improved floodplain connectivity, about 400 feet of peripheral habitats, and increased channel boundary and floodplain roughness. Rehabilitated floodplain patch size would be about 1.2 acres. Project Area FE-YF8.1-RL: <ol style="list-style-type: none">1) regrade gravel pit to create a larger floodplain patch2) construct perennial, floodplain-type side channels3) construct groundwater fed alcove at mouth of downstream side channel4) place wood structures along streambank and side channels5) place a constructed riffle at cross-over downstream of RM 8.26) load floodplain with wood material for complexity and roughness7) plant appropriate vegetation in cleared and disturbed areas Actions would result in improved floodplain connectivity, about 1500 feet of perennial side channel habitats, and increased channel boundary and floodplain roughness. Rehabilitated floodplain patch size would be about 8.7 acres. Project Area FE-YF8.0-RR: <ol style="list-style-type: none">1) regrade road embankment to create a larger floodplain patch2) consider placement of wood structures along streambank and on floodplain3) plant appropriate vegetation in disturbed areas Actions would result in improved floodplain connectivity, and increased channel boundary and floodplain roughness. Rehabilitated floodplain patch size would be about 1 acre.	Channel Length Impacted: <i>Existing Yankee Fork Channel:</i> 0.9 RM Channel Confinement: <i>Existing Yankee Fork Channel:</i> Moderately confined, free-formed alluvial channel Channel Planform: <i>Existing Yankee Fork Channel:</i> Straight Channel Bedform: <i>Existing Yankee Fork Channel:</i> Plane-bed Dominant Substrate: <i>Existing Yankee Fork Channel:</i> Cobble Riparian Condition: <i>Existing Yankee Fork Channel Buffer:</i> 30-50 feet Large Woody Material Recruitment Potential: <i>Existing Yankee Fork Channel:</i> Poor Floodplain Connectivity: <i>Existing Yankee Fork Channel:</i> Moderate Access to Peripheral Habitats: <i>Existing Yankee Fork Channel:</i> Poor	Channel Length Impacted: <i>Modified Yankee Fork Channel:</i> Same Channel Confinement: <i>Modified Yankee Fork Channel:</i> Unconfined, free-formed alluvial channel Channel Planform: <i>Modified Yankee Fork Channel:</i> Straight with short meandering sections Channel Bedform: <i>Modified Yankee Fork Channel:</i> Predominantly plane-bed with pool-riffle sections Dominant Substrate: <i>Modified Yankee Fork Channel:</i> Gravel and cobble Riparian Condition: <i>Modified Yankee Fork Channel Buffer:</i> 30-200 feet Large Woody Material Recruitment Potential: <i>Modified Yankee Fork Channel:</i> Moderate-to-good Floodplain Connectivity: <i>Modified Yankee Fork Channel:</i> Good Access to Peripheral Habitats: <i>Modified Yankee Fork Channel:</i> Good	4: Riparian Condition 4.1: Riparian Condition – loss of organic matter, riparian vegetation, large woody material, fish cover, and natural shade. 4.2: Large Woody Material Recruitment – loss of mature riparian vegetation and mature trees available for channel recruitment resulting in a decline in habitat complexity. 5: Peripheral and Transitional Habitats 5.1: Side Channel and Wetland Conditions – loss of mainstem channel interactions with side channels, wetlands, and other peripheral habitats. 5.2: Floodplain Condition – loss of access to the over or beyond bank habitat that was periodically inundated during high flows. 6: Channel Structure and Form 6.1: Bed and Channel Form – loss of channel sinuosity, bedform roughness and diversity, and substrate sorting and gravel retention. 6.2: Instream Structural Complexity – loss of riparian buffer zone and large woody material leading to declines in channel boundary and instream roughness, resulting in reductions in bedform diversity, habitat complexity, and instream variability. 7: Sediment Conditions 7.1: Decreased Sediment Quantity – decline in available spawning habitats due to lack of gravel sorting and retention.

Project	Priority	Description	Existing Condition Metrics	Target Condition Metrics	Limiting Factors Addressed
		<p>Project Area FE-YF7.8-RR:</p> <ol style="list-style-type: none">1) regrade dredge tailings to create a larger floodplain patch2) construct intermittent overflow channel3) place wood structure downstream of overflow channel inlet4) consider placement of wood structures along streambank and floodplain5) plant appropriate vegetation in cleared and disturbed areas <p>Actions would result in improved floodplain connectivity, about 700 feet of peripheral habitats, and increased channel boundary and floodplain roughness. Rehabilitated floodplain patch size would be about 1.7 acres.</p> <p>Project Area FE-YF7.6-RL:</p> <ol style="list-style-type: none">1) regrade terrace to create an island and split-flow channel2) place apex logjam structure at head of island3) place wood structures along streambank and split-flow channel4) place a constructed riffle downstream of RM 7.7 at cross-over5) load floodplain with wood material6) plant appropriate vegetation in cleared and disturbed areas <p>Actions would result in a reduction in streampower and sediment transport capacity, improved floodplain connectivity, about 1200 feet of intermittent side channel habitats, and increased channel boundary and floodplain roughness. Rehabilitated floodplain patch size would be about 4.7 acres.</p> <p>Project Area FE-YF7.5-RR: Maintain and monitor existing conditions. Actions implemented upstream of project area will result in an increase in floodplain connectivity, and additional wood loading may be needed if erosion starts to occur at an unnatural rate. Floodplain patch size is about 0.6 acres.</p> <p>Focal Species: Chinook salmon, steelhead, bull trout, and westslope cutthroat.</p> <p>Viable Salmonid Population (VSP) Parameters Improved: Abundance and productivity.</p>			
Bonanza Area Jordan Creek (Mouth)	Tier 2	<p>Tributary Enhancement: The goal is to improve upstream and downstream juvenile fish passage by reducing channel gradient and increasing instream roughness.</p> <p>Potential Project Considerations Include, But Are Not Limited To, The Following: Construction could involve:</p> <ol style="list-style-type: none">1) manipulating or replacing existing grade control structures with drop structures dispersed along the length of the channelized section or roughened channel that may increase or maintain pools2) establishing a floodplain bench and riparian buffer zone3) placing instream structures (i.e., boulders and/or wood placements) to create diversity and variability of instream flow velocities <p>Focal Species: Chinook salmon, steelhead, bull trout, and westslope cutthroat.</p> <p>Viable Salmonid Population (VSP) Parameters Improved: Productivity and spatial diversity.</p>	<p>Channel Length Impacted: <i>Existing Jordan Creek Channel:</i> 0.05 RM</p> <p>Channel Confinement: <i>Existing Jordan Creek Channel:</i> Artificially confined, alluvial channel</p> <p>Channel Planform: <i>Existing Jordan Creek Channel:</i> Straight</p> <p>Channel Bedform: <i>Existing Jordan Creek Channel:</i> Plane-bed</p> <p>Dominant Substrate: <i>Existing Jordan Creek Channel:</i> Cobble</p> <p>Riparian Condition: <i>Existing Jordan Creek Channel Buffer:</i> <5 feet</p>	<p>Channel Length Impacted: <i>Modified Jordan Creek Channel:</i> Same</p> <p>Channel Confinement: <i>Modified Jordan Creek Channel:</i> Same</p> <p>Channel Planform: <i>Modified Jordan Creek Channel:</i> Same</p> <p>Channel Bedform: <i>Modified Jordan Creek Channel:</i> Step-pool</p> <p>Dominant Substrate: <i>Modified Jordan Creek Channel:</i> Cobble and boulder</p> <p>Riparian Condition: <i>Modified Jordan Creek Channel Buffer:</i> Same</p>	<p>1: Habitat Quantity</p> <p>1.1: Anthropogenic Barriers – juvenile fish passage issues along Jordan Creek during spring freshet due to grade control structures and channelization.</p> <p>6: Channel Structure and Form</p> <p>6.1: Bed and Channel Form – channelized and steepened resulting in a loss of channel sinuosity, and bedform roughness and diversity.</p> <p>6.2: Instream Structural Complexity – loss of diverse bedforms resulting in a high-energy, straight channel with uniform flow with very little stream complexity to create flow diversity.</p>

Project	Priority	Description	Existing Condition Metrics	Target Condition Metrics	Limiting Factors Addressed
			<u>Large Woody Material Recruitment Potential:</u> <i>Existing Jordan Creek Channel:</i> Poor <u>Floodplain Connectivity:</u> <i>Existing Jordan Creek Channel:</i> Poor <u>Access to Peripheral Habitats:</u> <i>Existing Jordan Creek Channel:</i> Poor	<u>Large Woody Material Recruitment Potential:</u> <i>Modified Jordan Creek Channel:</i> Same <u>Floodplain Connectivity:</u> <i>Modified Jordan Creek Channel:</i> Same <u>Access to Peripheral Habitats:</u> <i>Modified Jordan Creek Channel:</i> Same	
Pole Flat Area Geomorphic Reach (Yankee Fork RM 6.80-3.10)					
<i>Pole Flat Area Channel Segment RM 6.8-6.55</i>	Tier 1	<u>Floodplain Enhancement and Instream Complexity:</u> There are two goals associated with the rehabilitation of this channel segment that include: 1) re-establishing channel and floodplain interactions 2) increasing channel complexity and improving channel geometry <u>Potential Project Considerations Include, But Are Not Limited To, The Following:</u> Project Area FE-YF6.7-RR: 1) create a larger floodplain patch by regrading dredge tailings 2) place wood structures along streambank 3) plant appropriate vegetation in disturbed area Actions would result in improved floodplain connectivity and increased channel boundary roughness. Rehabilitated floodplain patch size would be about 1.4 acres. <u>Focal Species:</u> Chinook salmon, steelhead, bull trout, and westslope cutthroat. <u>Viable Salmonid Population (VSP) Parameters Improved:</u> Abundance and productivity.	<u>Channel Length Impacted:</u> <i>Existing Yankee Fork Channel:</i> 0.25 RM <u>Channel Confinement:</u> <i>Existing Yankee Fork Channel:</i> Moderately confined, free-formed alluvial channel <u>Channel Planform:</u> <i>Existing Yankee Fork Channel:</i> Straight <u>Channel Bedform:</u> <i>Existing Yankee Fork Channel:</i> Plane-bed <u>Dominant Substrate:</u> <i>Existing Yankee Fork Channel:</i> Cobble <u>Riparian Condition:</u> <i>Existing Yankee Fork Channel Buffer:</i> 5-90 feet <u>Large Woody Material Recruitment Potential:</u> <i>Existing Yankee Fork Channel:</i> Moderate <u>Floodplain Connectivity:</u> <i>Existing Yankee Fork Channel:</i> Moderate	<u>Channel Length Impacted:</u> <i>Modified Yankee Fork Channel:</i> Same <u>Channel Confinement:</u> <i>Modified Yankee Fork Channel:</i> Same, but larger floodplain patch will increase the area available for lateral channel migration <u>Channel Planform:</u> <i>Modified Yankee Fork Channel:</i> Same <u>Channel Bedform:</u> <i>Modified Yankee Fork Channel:</i> Same <u>Dominant Substrate:</u> <i>Modified Yankee Fork Channel:</i> Same, but an increase in wood availability and more hydraulic diversity may result in additional gravel sorting and retention and increased bedform diversity <u>Riparian Condition:</u> <i>Modified Yankee Fork Channel Buffer:</i> 20-90 feet <u>Large Woody Material Recruitment Potential:</u> <i>Modified Yankee Fork Channel:</i> Same, but increasing with wood placements and floodplain loading <u>Floodplain Connectivity:</u> <i>Modified Yankee Fork Channel:</i> Good, improving instream and channel boundary roughness should increase floodplain connectivity	<u>4: Riparian Condition</u> 4.1: Riparian Condition – loss of organic matter, riparian vegetation, large woody material, fish cover, and natural shade. 4.2: Large Woody Material Recruitment – loss of mature riparian vegetation and mature trees available for channel recruitment resulting in a decline in habitat complexity. <u>5: Peripheral and Transitional Habitats</u> 5.2: Floodplain Condition – loss of access to the over or beyond bank habitat that was periodically inundated during high flows. <u>6: Channel Structure and Form</u> 6.2: Instream Structural Complexity – loss of riparian buffer zone and large woody material leading to declines in channel boundary and instream roughness, resulting in reductions in bedform diversity, habitat complexity, and instream variability. <u>7: Sediment Conditions</u> 7.1: Decreased Sediment Quantity – decline in available spawning habitats due to lack of gravel sorting and retention.

Project	Priority	Description	Existing Condition Metrics	Target Condition Metrics	Limiting Factors Addressed
			<u>Access to Peripheral Habitats:</u> <i>Existing Yankee Fork Channel:</i> Moderate	<u>Access to Peripheral Habitats:</u> <i>Modified Yankee Fork Channel:</i> Good, as floodplain connectivity and bedform diversity improves, so will the availability of peripheral habitats	
<i>Pole Flat Area Channel Segment RM 6.55-6.0</i>	Tier 1	<p><u>Floodplain Enhancement and Instream Complexity:</u> There are two goals associated with the rehabilitation of this channel segment that include:</p> <ol style="list-style-type: none">1) re-establishing channel and floodplain interactions2) increasing channel complexity and improving channel geometry <p><u>Potential Project Considerations Include, But Are Not Limited To, The Following:</u> <u>Project Area FE-YF6.45-RL:</u></p> <ol style="list-style-type: none">1) create a larger floodplain patch by regrading dredge tailings2) construct a perennial, floodplain-type side channel3) place a wood structure downstream of side channel inlet4) place wood structures along streambank and side channel5) plant appropriate vegetation in cleared and disturbed areas <p>Actions would result in improved floodplain connectivity, about 450 feet of perennial side channel habitats, and increased channel boundary roughness. Rehabilitated floodplain patch size would be about 1.4 acres.</p> <p><u>Project Area FE-YF6.35-RR:</u> Maintain and monitor existing conditions. Actions implemented upstream of project area will result in an increase in floodplain connectivity, and additional wood loading may be needed if erosion starts to occur at an unnatural rate. Floodplain patch size is about 0.3 acres.</p> <p><u>Project Area FE-YF6.3-RL:</u></p> <ol style="list-style-type: none">1) construct a perennial, floodplain-type side channel2) place a wood structure downstream of side channel inlet3) consider additional placement of wood structures along streambank and side channel4) plant appropriate vegetation in cleared and disturbed areas <p>Actions would result in improved floodplain connectivity, about 500 feet of perennial side channel habitats, and increased channel boundary roughness. Rehabilitated floodplain patch size would be about 0.6 acres.</p> <p><u>Project Area FE-YF6.2-RR:</u></p> <ol style="list-style-type: none">1) enhance flows into evolving floodplain-type side channel by placing an apex log jam at head of gravel bar to create flow divergence2) consider additional placement of wood structures along the streambank and side channel3) plant appropriate vegetation in cleared and disturbed areas <p>Actions would result in improved floodplain connectivity, about 450 feet of perennial side channel habitats, and increased channel boundary roughness. Rehabilitated floodplain patch size would about 0.9 acres.</p> <p><u>Project Area FE-YF6.1-RR:</u> Maintain and monitor existing conditions. Actions implemented upstream of project area may result in an increase in floodplain connectivity, and additional wood loading may be needed if erosion starts to occur at an unnatural rate. Floodplain patch size is about 0.5 acres.</p> <p><u>Focal Species:</u> Chinook salmon, steelhead, bull trout, and westslope cutthroat.</p> <p><u>Viable Salmonid Population (VSP) Parameters Improved:</u> Abundance and productivity.</p>	<p><u>Channel Length Impacted:</u> <i>Existing Yankee Fork Channel:</i> 0.55 RM</p> <p><u>Channel Confinement:</u> <i>Existing Yankee Fork Channel:</i> Moderately confined, free-formed alluvial channel</p> <p><u>Channel Planform:</u> <i>Existing Yankee Fork Channel:</i> Straight</p> <p><u>Channel Bedform:</u> <i>Existing Yankee Fork Channel:</i> Plane-bed</p> <p><u>Dominant Substrate:</u> <i>Existing Yankee Fork Channel:</i> Cobble</p> <p><u>Riparian Condition:</u> <i>Existing Yankee Fork Channel Buffer:</i> 5-70 feet</p> <p><u>Large Woody Material Recruitment Potential:</u> <i>Existing Yankee Fork Channel:</i> Moderate</p> <p><u>Floodplain Connectivity:</u> <i>Existing Yankee Fork Channel:</i> Moderate</p> <p><u>Access to Peripheral Habitats:</u> <i>Existing Yankee Fork Channel:</i> Moderate</p>	<p><u>Channel Length Impacted:</u> <i>Modified Yankee Fork Channel:</i> Same</p> <p><u>Channel Confinement:</u> <i>Modified Yankee Fork Channel:</i> Same, but larger floodplain patches will increase the area available for lateral channel migration</p> <p><u>Channel Planform:</u> <i>Modified Yankee Fork Channel:</i> Same</p> <p><u>Channel Bedform:</u> <i>Modified Yankee Fork Channel:</i> Same, but an increase in wood availability and instream roughness may result in more bedform diversity</p> <p><u>Dominant Substrate:</u> <i>Modified Yankee Fork Channel:</i> Same, but an increase in wood availability and more hydraulic diversity may result in additional gravel sorting and retention and increased bedform diversity</p> <p><u>Riparian Condition:</u> <i>Modified Yankee Fork Channel Buffer:</i> 5-200 feet, increasing the size of available floodplain results in an increase in the width of the riparian buffer zone</p> <p><u>Large Wood Material Recruitment Potential:</u> <i>Modified Yankee Fork Channel:</i> Moderate-to-good</p> <p><u>Floodplain Connectivity:</u> <i>Modified Yankee Fork Channel:</i> Good, improving instream and channel boundary roughness should increase floodplain connectivity</p> <p><u>Access to Peripheral Habitats:</u> <i>Modified Yankee Fork Channel:</i> Good, as floodplain connectivity and bedform diversity improves, so will the availability of peripheral habitats</p>	<p><u>4: Riparian Condition</u></p> <p>4.1: Riparian Condition – loss of organic matter, riparian vegetation, large woody material, fish cover, and natural shade.</p> <p>4.2: Large Woody Material Recruitment – loss of mature riparian vegetation and mature trees available for channel recruitment resulting in a decline in habitat complexity.</p> <p><u>5: Peripheral and Transitional Habitats</u></p> <p>5.2: Floodplain Condition – loss of access to the over or beyond bank habitat that was periodically inundated during high flows.</p> <p><u>6: Channel Structure and Form</u></p> <p>6.2: Instream Structural Complexity – loss of riparian buffer zone and large woody material leading to declines in channel boundary and instream roughness, resulting in reductions in bedform diversity, habitat complexity, and instream variability.</p> <p><u>7: Sediment Conditions</u></p> <p>7.1: Decreased Sediment Quantity – decline in available spawning habitats due to lack of gravel sorting and retention.</p>

Project	Priority	Description	Existing Condition Metrics	Target Condition Metrics	Limiting Factors Addressed
Pole Flat Area Channel Segment RM 6.0-5.75	Tier 1	<p>Floodplain Enhancement and Instream Complexity: There are two goals associated with the rehabilitation of this channel segment that include:</p> <ol style="list-style-type: none">1) re-establishing channel and floodplain interactions2) increasing channel complexity and improving channel geometry. <p>Potential Project Considerations Include, But Are Not Limited To, The Following: Project Area FE-YF5.9-RR:</p> <ol style="list-style-type: none">1) create a larger floodplain patch by regrading dredge tailings2) place wood structures along streambank3) plant appropriate vegetation in disturbed area <p>Actions would result in improved floodplain connectivity and increased channel boundary roughness. Rehabilitated floodplain patch size would about 2.2 acres.</p> <p>Focal Species: Chinook salmon, steelhead, bull trout, and westslope cutthroat.</p> <p>Viable Salmonid Population (VSP) Parameters Improved: Abundance and productivity.</p>	<p>Channel Length Impacted: <i>Existing Yankee Fork Channel:</i> 0.25 RM</p> <p>Channel Confinement: <i>Existing Yankee Fork Channel:</i> Moderately confined, free-formed alluvial channel</p> <p>Channel Planform: <i>Existing Yankee Fork Channel:</i> Straight</p> <p>Channel Bedform: <i>Existing Yankee Fork Channel:</i> Plane-bed</p> <p>Dominant Substrate: <i>Existing Yankee Fork Channel:</i> Cobble</p> <p>Riparian Condition: <i>Existing Yankee Fork Channel Buffer:</i> 5-120 feet</p> <p>Large Woody Material Recruitment Potential: <i>Existing Yankee Fork Channel:</i> Moderate</p> <p>Floodplain Connectivity: <i>Existing Yankee Fork Channel:</i> Moderate</p> <p>Access to Peripheral Habitats: <i>Existing Yankee Fork Channel:</i> Moderate</p>	<p>Channel Length Impacted: <i>Modified YF Channel:</i> Same</p> <p>Channel Confinement: <i>Modified YF Channel:</i> Same, but larger floodplain patches will increase the area available for lateral channel migration</p> <p>Channel Planform: <i>Modified Yankee Fork Channel:</i> Same</p> <p>Channel Bedform: <i>Modified Yankee Fork Channel:</i> Same, but an increase in wood availability and instream roughness may result in more bedform diversity</p> <p>Dominant Substrate: <i>Modified Yankee Fork Channel:</i> Same, but an increase in wood availability and more hydraulic diversity may result in additional gravel sorting and retention and increased bedform diversity</p> <p>Riparian Condition: <i>Modified Yankee Fork Channel Buffer:</i> 40-120 feet, increasing the size of available floodplain results in an increase in the width of the riparian buffer zone</p> <p>Large Woody Material Recruitment Potential: <i>Modified Yankee Fork Channel:</i> Moderate-to-good</p> <p>Floodplain Connectivity: <i>Modified Yankee Fork Channel:</i> Good, improving instream and channel boundary roughness should increase floodplain connectivity</p> <p>Access to Peripheral Habitats: <i>Modified Yankee Fork Channel:</i> Good, as floodplain connectivity and bedform diversity improves, so will the availability of peripheral habitats</p>	<p>4: Riparian Condition</p> <p>4.1: Riparian Condition – loss of organic matter, riparian vegetation, large woody material, fish cover, and natural shade.</p> <p>4.2: Large Woody Material Recruitment – loss of mature riparian vegetation and mature trees available for channel recruitment resulting in a decline in habitat complexity.</p> <p>5: Peripheral and Transitional Habitats</p> <p>5.2: Floodplain Condition – loss of access to the over or beyond bank habitat that was periodically inundated during high flows.</p> <p>6: Channel Structure and Form</p> <p>6.2: Instream Structural Complexity – loss of riparian buffer zone and large woody material leading to declines in channel boundary and instream roughness, resulting in reductions in bedform diversity, habitat complexity, and instream variability.</p> <p>7: Sediment Conditions</p> <p>7.1: Decreased Sediment Quantity – decline in available spawning habitats due to lack of gravel sorting and retention.</p>
Pole Flat Area Channel Segment RM 5.75-4.6	Tier 1	<p>Floodplain Enhancement and Instream Complexity: There are two goals associated with the rehabilitation of this channel segment that include:</p> <ol style="list-style-type: none">1) re-establishing channel and floodplain interactions2) increasing channel complexity and improving channel geometry	<p>Channel Length Impacted: <i>Existing Yankee Fork Channel:</i> 1.15 RM</p>	<p>Channel Length Impacted: <i>Modified Yankee Fork Channel:</i> Same</p>	<p>4: Riparian Condition</p> <p>4.1: Riparian Condition – loss of organic matter, riparian vegetation, large woody material, fish cover, and natural shade.</p>

Project	Priority	Description	Existing Condition Metrics	Target Condition Metrics	Limiting Factors Addressed
		<p>Potential Project Considerations Include, But Are Not Limited To, The Following:</p> <p>Project Area FE-YF5.7-RL: Maintain and monitor existing conditions. Actions implemented upstream of project area may result in an increase in floodplain connectivity, and additional wood loading may be needed if erosion starts to occur at an unnatural rate. Floodplain patch size is about 0.6 acres.</p> <p>Project Area FE-YF5.6-RR: Maintain and monitor existing conditions. Actions implemented along Pond Series Two may result in an increase in additional wood loading and planting of disturbed areas when constructed. Floodplain patch size is about 1.7 acres.</p> <p>Project Area FE-YF5.5-RL: This floodplain enhancement project area should be implemented in conjunction with reconnecting Jerrys Creek to the mainstem Yankee Fork. Proposed floodplain conditions are to:</p> <ol style="list-style-type: none">1) create a larger floodplain patch by regrading dredge tailings2) construct perennial floodplain-type side channel and ephemeral overflow channels3) place wood structures downstream of side channel and overflow channel inlets4) place wood structures along the streambank and side channels5) load floodplain with wood material for complexity and roughness6) plant appropriate vegetation in cleared and disturbed areas <p>Actions would result in improved floodplain connectivity, about 400 feet of perennial side channel habitats (depending on how Jerrys Creek is reconnected), and increased channel boundary and floodplain roughness. Rehabilitated floodplain patch size would be about 3.1 acres.</p> <p>Project Area FE-YF5.4-RR: Maintain and monitor existing conditions. Actions implemented upstream of project area may result in an increase in floodplain connectivity, and additional wood loading may be needed if erosion starts to occur at an unnatural rate. Floodplain patch size is about 0.6 acres.</p> <p>Project Area FE-YF5.3-RL:</p> <ol style="list-style-type: none">1) create a larger floodplain patch by regrading dredge tailings2) construct a perennial floodplain-type side channel3) place wood structure downstream of side channel inlet4) place wood structures along the streambank and side channel5) load floodplain with wood material for complexity and roughness6) plant appropriate vegetation in disturbed areas <p>Constructing a groundwater dominated wetland by interconnecting dredge ponds and constructing a connection to mainstem Yankee Fork may be considered. Actions would result in improved floodplain connectivity, about 600 feet of perennial side channel habitat, and increased channel boundary and floodplain roughness. Rehabilitated floodplain patch size would be about 2.4 acres.</p> <p>Project Area FE-YF5.1-RR:</p> <ol style="list-style-type: none">1) maintain or enhance the large floodplain patch2) maintain or enhance existing overflow channels and floodplain-type side channel that were functioning adequately3) load floodplain with additional wood material to enhance complexity and roughness4) remove road embankment near RM 4.95 and consider removing dredge tailings <p>Actions would result in improved floodplain connectivity, potentially increased side channel evolution, and potentially increased channel boundary and floodplain roughness. Rehabilitated floodplain patch size would be about 4.6 acres.</p>	<p>Channel Confinement: <i>Existing Yankee Fork Channel:</i> Moderately confined, free-formed alluvial channel</p> <p>Channel Planform: <i>Existing Yankee Fork Channel:</i> Straight</p> <p>Channel Bedform: <i>Existing Yankee Fork Channel:</i> Plane-bed</p> <p>Dominant Substrate: <i>Existing Yankee Fork Channel:</i> Cobble</p> <p>Riparian Condition: <i>Existing Yankee Fork Channel Buffer:</i> 10-240 feet</p> <p>Large Woody Material Recruitment Potential: <i>Existing YF Channel:</i> Poor-to-moderate</p> <p>Floodplain Connectivity: <i>Existing Yankee Fork Channel:</i> Moderate</p> <p>Access to Peripheral Habitats: <i>Existing Yankee Fork Channel:</i> Moderate</p>	<p>Channel Confinement: <i>Modified Yankee Fork Channel:</i> Unconfined, free-formed alluvial channel</p> <p>Channel Planform: <i>Modified Yankee Fork Channel:</i> Straight with short meandering sections</p> <p>Channel Bedform: <i>Modified Yankee Fork Channel:</i> Predominantly plane-bed with short pool-riffle sections</p> <p>Dominant Substrate: <i>Modified Yankee Fork Channel:</i> Same, but an increase in wood availability and more hydraulic diversity may result in additional gravel sorting and retention and increased bedform diversity</p> <p>Riparian Condition: <i>Modified Yankee Fork Channel Buffer:</i> Same average width</p> <p>Large Woody Material Recruitment Potential: <i>Modified Yankee Fork Channel:</i> Good</p> <p>Floodplain Connectivity: <i>Modified Yankee Fork Channel:</i> Good, improving instream and channel boundary roughness should increase floodplain connectivity</p> <p>Access to Peripheral Habitats: <i>Modified Yankee Fork Channel:</i> Good, as floodplain connectivity and bedform diversity improves, so will the availability of peripheral habitats</p>	<p>4.2: Large Woody Material Recruitment – loss of mature riparian vegetation and mature trees available for channel recruitment resulting in a decline in habitat complexity.</p> <p>5: Peripheral and Transitional Habitats</p> <p>5.1: Side Channel and Wetland Conditions – loss of mainstem channel interactions with side channels, wetlands and other peripheral habitats.</p> <p>5.2: Floodplain Condition – loss of access to the over or beyond bank habitat that was periodically inundated during high flows.</p> <p>6: Channel Structure and Form</p> <p>6.1: Bed and Channel Form – loss of channel sinuosity, bedform roughness and diversity, and substrate sorting and gravel retention.</p> <p>6.2: Instream Structural Complexity – loss of riparian buffer zone and large woody material leading to declines in channel boundary and instream roughness, resulting in reductions in bedform diversity, habitat complexity, and instream variability.</p> <p>7: Sediment Conditions</p> <p>7.1: Decreased Sediment Quantity – decline in available spawning habitats due to lack of gravel sorting and retention.</p>

Project	Priority	Description	Existing Condition Metrics	Target Condition Metrics	Limiting Factors Addressed
		<p>Project Area FE-YF5.0-RL:</p> <ol style="list-style-type: none">1) create a larger floodplain patch by regrading dredge tailings2) construct perennial floodplain-type side channel3) place wood structure downstream of side channel inlet4) place wood structures along streambank and side channel5) load floodplain with wood material to enhance complexity and roughness6) plant appropriate vegetation in cleared and disturbed areas <p>Actions would result in improved floodplain connectivity, potentially increased side channel evolution, and potentially increased channel boundary and floodplain roughness. Rehabilitated floodplain patch size would be about 3.1 acres.</p> <p>Project Area FE-YF4.85-RR: Maintain and monitor existing conditions. Actions implemented upstream of project area may result in an increase in floodplain connectivity, and additional wood loading may be needed if erosion starts to occur at an unnatural rate. Floodplain patch size is about 0.7 acres.</p> <p>Project Area FE-YF4.75-RL:</p> <ol style="list-style-type: none">1) construct perennial floodplain-type side channel by removing dredge tailings near head and along the existing overflow channel as needed to improve connectivity2) place a wood structure downstream of the inlet to side channel3) place wood structures along streambank and side channel4) plant appropriate vegetation in cleared and disturbed areas <p>Actions would result in improved floodplain connectivity, about 350 feet of perennial side channel habitats, and increased channel boundary and floodplain roughness. Rehabilitated floodplain patch size would be about 0.4 acres.</p> <p>Project Area FE-YF4.65-RR: Maintain and monitor existing conditions. Actions implemented upstream of project area may result in an increase in floodplain connectivity, and additional wood loading may be needed if erosion starts to occur at an unnatural rate. Floodplain patch size is about 0.5 acres.</p> <p>Focal Species: Chinook salmon, steelhead, bull trout, and westslope cutthroat.</p> <p>Viable Salmonid Population (VSP) Parameters Improved: Abundance and productivity.</p>			
Pole Flat Area Jerrys Creek (Tributary)	Tier 1	<p>Tributary Reconnect: The goals are to:</p> <ol style="list-style-type: none">1) create fish access into the Jerrys Creek watershed2) re-establish sediment and nutrient inputs from the watershed to the Yankee Fork <p>Potential Project Considerations Include, But Are Not Limited To, The Following: Reconnect Jerrys Creek to the mainstem Yankee Fork by constructing channel-type habitats through dredge tailings toward the southwest, crossing the Custer Motorway, to the mainstem Yankee Fork near RM 5.5. Jerrys Creek currently sinks within the dredge pond and only occasionally drains north towards the mainstem Yankee Fork near RM 5.8. The constructed channel would provide year-round ingress and egress for salmonids to the mainstem Yankee Fork with both an upstream and downstream connection. In addition, the alcove at the inlet downstream of RM 5.8 could potentially be improved to allow more flow from the mainstem Yankee Fork into the existing channel which would then be routed back to the mainstem Yankee Fork through the constructed channel.</p>	<p>Fish Access to Watershed: <i>Existing Condition:</i> Intermittent connection, only at very high flows (probably about 50+ year recurrence interval), to mainstem Yankee Fork</p>	<p>Fish Access to Watershed: <i>Target Condition:</i> Seasonal connection to mainstem Yankee Fork</p> <p>Watershed Metrics: <i>Drainage Area:</i> 580 acres <i>Flow:</i> Perennial</p>	<p>1: Habitat Quantity</p> <p>1.1: Anthropogenic Barrier – loss of access to habitat and habitat subtypes due to anthropogenic activity (dredging).</p> <p>3: Food</p> <p>3.1: Altered Primary Productivity – loss of nutrient inputs to the mainstem Yankee Fork resulting in an alteration of ecological dynamics.</p> <p>5: Peripheral and Transitional Habitats</p> <p>5.1: Side Channel and Wetland Conditions – loss of access to perennial, tributary-type habitat.</p>

Project	Priority	Description	Existing Condition Metrics	Target Condition Metrics	Limiting Factors Addressed
		<p>The constructed channel would involve regrading dredge tailing mounds and placement of a bridge or bottomless culvert along the Custer Motorway. Fines may need to be added to the channel bed so that surface flows can be maintained over the reworked dredge tailings. Appropriate floodplain vegetation should be planted along the floodway that would provide root-strength along the banks to maintain channel geometry and boundary roughness.</p> <p>Focal Species: Chinook salmon, steelhead, bull trout, and westslope cutthroat.</p> <p>Viable Salmonid Population (VSP) Parameters Improved: Abundance and productivity, and spatial structure and diversity.</p>			<p>7: Sediment Conditions</p> <p>7.1: Decreased Sediment Quantity – loss of sediment (includes wood) inputs to mainstem Yankee Fork.</p>
Pole Flat Area Channel Segment RM 4.6-4.1	Tier 1	<p>Floodplain Enhancement and Instream Complexity: There are two goals associated with the rehabilitation of this channel segment that include:</p> <ol style="list-style-type: none"> 1) re-establishing channel and floodplain interactions 2) increasing channel complexity and improving channel geometry <p>Potential Project Considerations Include, But Are Not Limited To, The Following: Project Area FE-YF4.5-RL: This floodplain enhancement project area should be implemented in conjunction with the Ramey Creek tributary enhancement project. Proposed floodplain conditions are to:</p> <ol style="list-style-type: none"> 1) create a larger floodplain patch by regrading dredge tailings 2) construct perennial floodplain-type side channel 3) place wood structures downstream of inlet to side channel 4) place wood structures along the streambank and side channel 5) load floodplain with wood material for complexity and roughness 6) plant appropriate vegetation in cleared and disturbed areas <p>Actions would result in improved floodplain connectivity, about 800 feet of perennial side channel habitats (depending on how Ramey Creek is enhanced), and increased channel boundary and floodplain roughness. Rehabilitated floodplain patch size would be about 4 acres.</p> <p>Project Area FE-YF4.3-RR:</p> <ol style="list-style-type: none"> 1) create a larger floodplain patch by regrading road embankments 2) construct inlet to floodplain-type side channel upstream of RM 4.2 3) place apex log jam on vegetated gravel bar to force flow divergence 4) place wood structures along streambank and side channel 5) load floodplain with wood material to enhance complexity and roughness 6) plant appropriate vegetation in cleared and disturbed areas <p>Actions would result in improved floodplain connectivity, about 800 feet of perennial side channel habitats, and increased channel boundary and floodplain roughness. Rehabilitated floodplain patch size would be about 3 acres.</p> <p>Project Area FE-YF4.25-RL:</p> <ol style="list-style-type: none"> 1) create a larger floodplain patch by regrading dredge tailings 2) construct perennial floodplain-type side channel 3) place wood structure downstream of inlet 4) place wood structures along streambank and side channel 5) load floodplain with wood material to enhance complexity and roughness 6) plant appropriate vegetation in cleared and disturbed areas 	<p>Channel Length Impacted: <i>Existing Yankee Fork Channel:</i> 0.50 RM</p> <p>Channel Confinement: <i>Existing Yankee Fork Channel:</i> Moderately confined, free-formed alluvial channel</p> <p>Channel Planform: <i>Existing Yankee Fork Channel:</i> Straight</p> <p>Channel Bedform: <i>Existing Yankee Fork Channel:</i> Plane-bed</p> <p>Dominant Substrate: <i>Existing Yankee Fork Channel:</i> Cobble</p> <p>Riparian Condition: <i>Existing Yankee Fork Channel Buffer:</i> 10-100 feet</p> <p>Large Woody Material Recruitment Potential: <i>Existing Yankee Fork Channel:</i> Moderate</p> <p>Floodplain Connectivity: <i>Existing Yankee Fork Channel:</i> Poor-to-moderate</p>	<p>Channel Length Impacted: <i>Modified Yankee Fork Channel:</i> Same</p> <p>Channel Confinement: <i>Modified Yankee Fork Channel:</i> Same</p> <p>Channel Planform: <i>Modified Yankee Fork Channel:</i> Straight with short meandering sections</p> <p>Channel Bedform: <i>Modified YF Channel:</i> Predominantly plane-bed with short pool-riffle sections</p> <p>Dominant Substrate: <i>Modified YF Channel:</i> Same, but an increase in wood availability and more hydraulic diversity may result in additional gravel sorting and retention and increased bedform diversity</p> <p>Riparian Condition: <i>Modified Yankee Fork Channel Buffer:</i> 10-200 feet, increasing the size of available floodplain results in an increase in the width of the riparian buffer zone</p> <p>Large Woody Material Recruitment Potential: <i>Modified Yankee Fork Channel:</i> Moderate-to-good</p> <p>Floodplain Connectivity: <i>Modified Yankee Fork Channel:</i> Moderate-to-good, improving instream and channel boundary roughness should increase floodplain connectivity</p>	<p>4: Riparian Condition</p> <p>4.1: Riparian Condition – loss of organic matter, riparian vegetation, large woody material, fish cover, and natural shade.</p> <p>4.2: Large Woody Material Recruitment – loss of mature riparian vegetation and mature trees available for channel recruitment resulting in a decline in habitat complexity.</p> <p>5: Peripheral and Transitional Habitats</p> <p>5.2: Floodplain Condition – loss of access to the over or beyond bank habitat that was periodically inundated during high flows.</p> <p>6: Channel Structure and Form</p> <p>6.2: Instream Structural Complexity – loss of riparian buffer zone and large woody material leading to declines in channel boundary and instream roughness, resulting in reductions in bedform diversity, habitat complexity, and instream variability.</p> <p>7: Sediment Conditions</p> <p>7.1: Decreased Sediment Quantity – decline in available spawning habitats due to lack of gravel sorting and retention.</p>

Project	Priority	Description	Existing Condition Metrics	Target Condition Metrics	Limiting Factors Addressed
		<p>Actions would result in improved floodplain connectivity, about 300 feet of perennial side channel habitats, and increased channel boundary and floodplain roughness. Rehabilitated floodplain patch size would be about 0.5 acres.</p> <p>Project Area FE-YF4.1-RL: Maintain and monitor existing conditions. Actions implemented upstream of project area may result in an increase in floodplain connectivity, and additional wood loading may be needed if erosion starts to occur at an unnatural rate. Floodplain patch size is about 0.7 acres.</p> <p>Focal Species: Chinook salmon, steelhead, bull trout, and westslope cutthroat.</p> <p>Viable Salmonid Population (VSP) Parameters Improved: Abundance and Productivity.</p>	<p>Access to Peripheral Habitats: <i>Existing Yankee Fork Channel:</i> Poor-to-moderate</p>	<p>Access to Peripheral Habitats: <i>Modified Yankee Fork Channel:</i> Good, as floodplain connectivity and bedform diversity improves, so will the availability of peripheral habitats</p>	
Pole Flat Area Silver Creek (Tributary)	Tier 1	<p>Tributary Reconnect: The goals are to:</p> <ol style="list-style-type: none">1) create fish access into the Silver Creek watershed2) re-establish sediment and nutrient inputs from the watershed to the Yankee Fork <p>Potential Project Considerations Include, But Are Not Limited To, The Following: Reconnect Silver Creek directly to the mainstem Yankee Fork by constructing a floodway and channel through dredge tailing mounds from where it flows onto the valley floor to the mainstem Yankee Fork near RM 4.2. The constructed channel will provide year-round ingress and egress to the Silver Creek drainage. Landownership is predominantly Private (J.R. Simplot Company) with some Public (Salmon-Challis National Forest) lands.</p> <p>The constructed floodway and channel will involve regrading dredge tailings, and placement of a bridge or bottomless culvert through the Custer Motorway road. Fines may need to be added to the channel bed so that surface flows can be maintained over the reworked dredge tailings. Wood placements along constructed channel and floodplain would be needed to maintain channel geometry and instream complexity. Appropriate floodplain vegetation should be planted along the floodway that will provide root-strength along the banks to maintain channel geometry and boundary roughness.</p> <p>Focal Species: Chinook salmon, steelhead, bull trout, and westslope cutthroat.</p> <p>Viable Salmonid Population (VSP) Parameters Improved: Abundance and productivity, and spatial structure and diversity.</p>	<p>Fish Access to Watershed: <i>Existing Condition:</i> Completely disconnected from the mainstem Yankee Fork.</p>	<p>Fish Access to Watershed: <i>Target Condition:</i> Perennial connection to mainstem Yankee Fork.</p> <p>Watershed Metrics: <i>Drainage Area:</i> 1420 acres <i>Flow:</i> Perennial</p>	<p>1: Habitat Quantity</p> <p>1.1: Anthropogenic Barrier – loss of access to habitat and habitat subtypes due to anthropogenic activity (dredging).</p> <p>3: Food</p> <p>3.1: Altered Primary Productivity – loss of nutrient inputs to the mainstem Yankee Fork resulting in an alteration of ecological dynamics.</p> <p>5: Peripheral and Transitional Habitats</p> <p>5.1: Side Channel and Wetland Conditions – loss of access to perennial, tributary-type habitat.</p> <p>7: Sediment Conditions</p> <p>7.1: Decreased Sediment Quantity – loss of sediment (includes wood) inputs to mainstem Yankee Fork.</p>
Pole Flat Area Channel Segment RM 4.1-3.1	Tier 1	<p>Floodplain Enhancement and Instream Complexity: There are two goals associated with the rehabilitation of this channel segment that include:</p> <ol style="list-style-type: none">1) re-establishing channel and floodplain interactions2) increasing channel complexity and improving channel geometry <p>Potential Project Considerations Include, But Are Not Limited To, The Following: Project Area FE-YF4.0-RL: Maintain and monitor existing conditions. Actions implemented upstream of project area may result in an increase in floodplain connectivity, and additional wood loading may be needed if erosion starts to occur at an unnatural rate. Floodplain patch size is about 0.7 acres.</p> <p>Project Area FE-YF3.8-RL:</p> <ol style="list-style-type: none">1) construct a perennial floodplain-type side channel by regrading dredge tailings2) place apex logjam at head of gravel bar3) construct a groundwater fed alcove at the outlet of side channel4) place wood structure downstream of inlet to side channel5) place wood structures along streambank and side channel6) plant appropriate vegetation in disturbed areas	<p>Channel Length Impacted: <i>Existing Yankee Fork Channel:</i> 1.0 RM</p> <p>Channel Confinement: <i>Existing Yankee Fork Channel:</i> Predominantly a confined, free-formed alluvial channel</p> <p>Channel Planform: <i>Existing Yankee Fork Channel:</i> Straight</p> <p>Channel Bedform: <i>Existing Yankee Fork Channel:</i> Plane-bed</p>	<p>Channel Length Impacted: <i>Modified Yankee Fork Channel:</i> Same</p> <p>Channel Confinement: <i>Modified Yankee Fork Channel:</i> Same, but with an increase in average floodplain width</p> <p>Channel Planform: <i>Modified Yankee Fork Channel:</i> Same</p> <p>Channel Bedform: <i>Modified Yankee Fork Channel:</i> Same, but an increase in wood availability and instream roughness may result in more bedform diversity</p>	<p>4: Riparian Condition</p> <p>4.1: Riparian Condition – loss of organic matter, riparian vegetation, large woody material, fish cover, and natural shade.</p> <p>4.2: Large Woody Material Recruitment – loss of mature riparian vegetation and mature trees available for channel recruitment resulting in a decline in habitat complexity.</p> <p>5: Peripheral and Transitional Habitats</p> <p>5.2: Floodplain Condition – loss of access to the over or beyond bank habitat that was periodically inundated during high flows.</p>

Project	Priority	Description	Existing Condition Metrics	Target Condition Metrics	Limiting Factors Addressed
		<p>Actions would result in improved floodplain connectivity, about 500 feet of perennial side channel habitats, and increased channel boundary and floodplain roughness. Rehabilitated floodplain patch size would be about 0.8 acres.</p> <p>Project Area FE-YF3.5-RR: Maintain and monitor existing conditions. Actions implemented upstream of project area may result in an increase in floodplain connectivity, and additional wood loading may be needed if erosion starts to occur at an unnatural rate. Floodplain patch size is about 0.6 acres.</p> <p>Project Area FE-YF3.4-RL:</p> <ol style="list-style-type: none"> remove and re-grade dredge tailings to create a continuous floodplain patch connect groundwater side channel to mainstem Yankee Fork to create perennial floodplain-type side channel construct a groundwater fed alcove at the outlet side channel place wood structure downstream of inlet to side channel place wood structures along streambank and side channel plant appropriate vegetation in disturbed areas <p>Actions would result in improved floodplain connectivity, about 450 feet of perennial side channel habitats, groundwater fed alcove, and increased channel boundary and floodplain roughness. Rehabilitated floodplain patch size would be about 1.4 acres.</p> <p>Project Area FE-YF3.2-RR: Maintain and monitor existing conditions. Actions implemented upstream of project area may result in an increase in floodplain connectivity, and additional wood loading may be needed if erosion starts to occur at an unnatural rate. Floodplain patch size is about 2.2 acres.</p> <p>Focal Species: Chinook salmon, steelhead, bull trout, and westslope cutthroat.</p> <p>Viable Salmonid Population (VSP) Parameters Improved: Abundance and productivity.</p>	<p>Dominant Substrate: <i>Existing Yankee Fork Channel:</i> Cobble</p> <p>Riparian Condition: <i>Existing Yankee Fork Channel Buffer:</i> 5-160 feet</p> <p>Large Woody Material Recruitment Potential: <i>Existing Yankee Fork Channel:</i> Poor</p> <p>Floodplain Connectivity: <i>Existing Yankee Fork Channel:</i> Poor</p> <p>Access to Peripheral Habitats: <i>Existing Yankee Fork Channel:</i> Poor</p>	<p>Dominant Substrate: <i>Modified Yankee Fork Channel:</i> Same, but an increase in wood availability and more hydraulic diversity may result in additional gravel sorting and retention and increased bedform diversity</p> <p>Riparian Condition: <i>Modified Yankee Fork Channel Buffer:</i> Same, but improving structure and vitality of riparian vegetation</p> <p>Large Woody Material Recruitment Potential: <i>Modified Yankee Fork Channel:</i> Moderate, but improving due to floodplain loading and vegetation progressing through successional stages to maturity</p> <p>Floodplain Connectivity: <i>Modified Yankee Fork Channel:</i> Moderate, but improving instream and channel boundary roughness should increase floodplain connectivity</p> <p>Access to Peripheral Habitats: <i>Modified Yankee Fork Channel:</i> Moderate, but as floodplain connectivity and bedform diversity improves, so will the availability of peripheral habitats</p>	<p>6: Channel Structure and Form</p> <p>6.2: Instream Structural Complexity – loss of riparian buffer zone and large woody material leading to declines in channel boundary and instream roughness, resulting in reductions in bedform diversity, habitat complexity, and instream variability.</p> <p>7: Sediment Conditions</p> <p>7.1: Decreased Sediment Quantity – decline in available spawning habitats due to lack of gravel sorting and retention.</p>
Pole Flat Area Ramey Creek (Mouth)	Tier 2	<p>Tributary Enhancement: The goal is to improve upstream and downstream juvenile fish passage by increasing instream roughness.</p> <p>Potential Project Considerations Include, But Are Not Limited To, The Following: Improve upstream and downstream juvenile fish passage along Ramey Creek by removing and re-grading dredge tailing mounds at the Yankee Fork and Ramey Creek confluence, by replacing a culvert with a bridge or bottomless culvert that does not constrict the channel, and by adding additional roughness elements (i.e., boulders and/or wood).</p> <p>Focal Species: Chinook salmon, steelhead, bull trout, and westslope cutthroat.</p> <p>Viable Salmonid Population (VSP) Parameters Improved: Productivity and spatial structure.</p>	<p>Channel Length Impacted: <i>Existing Ramey Creek Channel:</i> 0.05 RM</p> <p>Channel Confinement: <i>Existing Ramey Creek Channel:</i> Artificially confined alluvial channel</p> <p>Channel Planform: <i>Existing Ramey Creek Channel:</i> Straight</p> <p>Channel Bedform: <i>Existing Ramey Creek Channel:</i> Plane-bed</p> <p>Dominant Substrate: <i>Existing Ramey Creek Channel:</i> Cobble</p> <p>Riparian Condition: <i>Existing Ramey Creek Channel Buffer:</i> 10-25 feet</p>	<p>Channel Length Impacted: <i>Modified Ramey Creek Channel:</i> Same</p> <p>Channel Confinement: <i>Modified Ramey Creek Channel:</i> Unconfined, free-formed alluvial channel</p> <p>Channel Planform: <i>Modified Ramey Creek Channel:</i> Straight-to-meandering</p> <p>Channel Bedform: <i>Modified Ramey Creek Channel:</i> Plane-bed to Pool-riffle</p> <p>Dominant Substrate: <i>Modified Ramey Creek Channel:</i> Cobble and gravel</p> <p>Riparian Condition: <i>Modified Ramey Creek Channel Buffer:</i> 10-150 feet</p>	<p>1: Habitat Quantity</p> <p>1.1: Anthropogenic Barriers – juvenile fish passage issues along Ramey Creek during spring freshet due to channelization and lack of instream and channel boundary roughness.</p> <p>6: Channel Structure and Form</p> <p>6.1: Bed and Channel Form – channelized and steepened resulting in a loss of channel sinuosity, and bedform roughness and diversity.</p> <p>6.2: Instream Structural Complexity – loss of diverse bedforms resulting in a high-energy, straight channel with uniform flow with very little stream complexity to create flow diversity.</p>

Project	Priority	Description	Existing Condition Metrics	Target Condition Metrics	Limiting Factors Addressed
			<p><u>Large Woody Material Recruitment Potential:</u> <i>Existing Ramey Creek Channel:</i> Poor</p> <p><u>Floodplain Connectivity:</u> <i>Existing Ramey Creek Channel:</i> Poor</p> <p><u>Access to Peripheral Habitats:</u> <i>Existing Ramey Creek Channel:</i> Poor</p>	<p><u>Large Woody Material Recruitment Potential:</u> <i>Modified Ramey Creek Channel:</i> Moderate, improving due to wood placements</p> <p><u>Floodplain Connectivity:</u> <i>Modified Ramey Creek Channel:</i> Moderate, improving instream and channel boundary roughness should increase floodplain connectivity</p> <p><u>Access to Peripheral Habitats:</u> <i>Modified Ramey Creek Channel:</i> Moderate, as floodplain connectivity and bedform diversity improves, so will the availability of peripheral habitats</p>	
<i>Pole Flat Area Pond Series</i>	Tier 3	<p>Adaptive Management: (Pond Series Four) Adaptive management concepts for Pond Series Four could potentially be in conflict with other rehabilitation efforts that could occur near the pond series inlet (see <i>Yankee Fork and West Fork Confluence Area</i>). Work on this pond series should be carefully planned and implemented so as not to conflict with potential future work at the Yankee Fork and West Fork confluence area. Design work should be based on the results of Pond Series Two (PS-2) and Pond Series Three (PS-3). Consider the groundwater dominated system in PS-2 if it is appropriate and found to generate more fish than the perennial side channel connection constructed in PS-3, then the design alternatives could focus on similar attributes, and vice versa if PS-3 is found to generate more fish.</p> <p>The potential concepts being considered for Pond Series Four include, but are not limited to, the following:</p> <ol style="list-style-type: none">1) replacing the upstream culvert with a bridge or bottomless culvert or maintaining the existing connection to the Yankee Fork2) if necessary, relocating the Yankee Fork Subdivision access road to the southwest so that the road and bridge will not be in conflict with the Yankee Fork and West Fork confluence rehabilitation area3) removing check structures between the individual ponds4) regrading sections along interconnecting channels to eliminate stranding potential5) placing wood for fish cover and to improve instream habitat diversity along length of reconnected side channel and pond habitats6) replanting riparian vegetation along the length of reconnected side channel and pond habitats as necessary. <p>Construction access to the pond series would probably from the east through areas where there are dredge tailing mounds. The objectives are to provide seasonal upstream connection and year-round downstream connection with the mainstem Yankee Fork. The goal is to improve habitat-forming processes by introducing more flow into the pond series, and to increase the diversity of available habitats that will address the habitat quantity and quality limiting factors. Improved perennial, downstream access from the mainstem Yankee Fork into diverse, quality habitat types.</p> <p>During the design phases, terrestrial wildlife connectivity between the pond series and mainstem Yankee Fork should be considered if a new crossing design is proposed (i.e., rock shelf). Groundwater upwelling becomes more prevalent especially downstream of the large pond, and there is the potential to regrade some of the interconnecting channels so that they do not dewater during low-flow periods. Groundwater seeps along the dredge tailing mounds tend to concentrate juvenile fish and it would be beneficial to place wood at these locations to provide cover from predators.</p>	<u>Not Applicable</u>	<u>Not Applicable</u>	<p><u>1: Habitat Quantity</u></p> <p>1.1: Anthropogenic Barriers – loss of access to habitat due to partial barriers (check structures and culvert).</p> <p><u>4: Riparian Condition</u></p> <p>4.2: Large Woody Material Recruitment – loss of mature riparian vegetation and mature trees available for channel recruitment resulting in a decline in habitat complexity.</p>

Project	Priority	Description	Existing Condition Metrics	Target Condition Metrics	Limiting Factors Addressed
	Tier 3	<p>Adaptive Management: (Pond Series Three)</p> <p>----- Constructed Fall 2012 -----</p> <p>The adaptive management goals were to improve habitat-forming processes by converting the artificial ponds to side and groundwater channels, and constructing a floodplain capable of passing higher flows that would increase channel-floodplain dynamics. The expected response was an increase in the diversity of available habitats (aquatic and terrestrial). Also to improve downstream passage conditions for young-of-the-year juveniles.</p>	<u>Not Applicable</u>	<u>Not Applicable</u>	<p>1: Habitat Quantity</p> <p>1.1: Anthropogenic Barriers – loss of access to habitat due to partial barriers (check structures and culvert).</p> <p>4: Riparian Condition</p> <p>4.2: Large Woody Material Recruitment – loss of mature riparian vegetation and mature trees available for channel recruitment resulting in a decline in habitat complexity.</p>
	Tier 3	<p>Adaptive Management: (Pond Series Two)</p> <p>Any adaptive management concepts for Pond Series Two would not be in conflict with any other rehabilitation efforts in the channel segment. The potential concepts being considered for Pond Series Two include, but are not limited to, the following:</p> <ol style="list-style-type: none"> 1) creating diverse habitat types along the lower, predominantly groundwater fed system 2) removing check structures and regrading interconnecting channels as necessary to improve connectivity and eliminate stranding potential 3) placing wood for fish cover and to improve instream habitat diversity along length of reconnected side channel and pond habitats 4) replanting riparian vegetation along the length of reconnected side channel and pond habitats as necessary. <p>These potential habitat actions should not preclude any future actions that could include improving the inlet to the pond series and/or filling in the ponds to increase and improve side channel habitats.</p> <p>Construction access to the pond series would be primarily from the east off the Custer Motorway road through dredge tailings that have been disturbed by previous activities associated rehabilitation efforts in the early 1990s. Regrading would be limited to the area near the five existing check structures and as necessary to reduce potential fish stranding during base flow conditions. This material would be removed to create a narrow riparian corridor and placed in adjacent ponds to create riparian areas in the ponds.</p> <p>The current goals are to:</p> <ol style="list-style-type: none"> 1) increase habitat quantity 2) increase habitat quality 3) provide winter thermal refugia, and provide early summer high flow refugia <p>Downstream access from the mainstem Yankee Fork into the pond series should be maintained or improved for juvenile fish passage.</p>	<u>Not Applicable</u>	<u>Not Applicable</u>	<p>1: Habitat Quantity</p> <p>1.1: Anthropogenic Barriers – loss of access to habitat due to partial barriers (check structures).</p> <p>4: Riparian Condition</p> <p>4.2: Large Woody Material Recruitment – loss of mature riparian vegetation and mature trees available for channel recruitment resulting in a decline in habitat complexity.</p>
	Tier 3	<p>Adaptive Management: (Pond Series One)</p> <p>Pond Series One is currently used as a put-and-take fishery by the Idaho Department of Fish and Game, and is also being considered as an acclimation pond for Chinook salmon and steelhead by the Shoshone-Bannock Tribes.</p> <p>As such, the potential concepts that could be considered include, but are not limited to, the following:</p> <ol style="list-style-type: none"> 1) replacing the downstream culvert with a bridge or bottomless culvert to maintain perennial connection to the Yankee Fork 2) removing check structures as needed to maintain perennial flows 3) regrading sections along interconnecting channels to eliminate stranding potential 	<u>Not Applicable</u>	<u>Not Applicable</u>	<p>1: Habitat Quantity</p> <p>1.1: Anthropogenic Barriers – loss of access to habitat due to partial barriers (check structures and culvert).</p>

Project	Priority	Description	Existing Condition Metrics	Target Condition Metrics	Limiting Factors Addressed
		<div>4) placing wood for fish cover and to improve instream habitat diversity along length of reconnected side channel and pond habitats</div> <div>5) replanting riparian vegetation along the length of reconnected side channel and pond habitats as necessary.</div> <div>Construction access to the pond series would probably be from the east through dredge tailings that have been disturbed by previous activities associated rehabilitation efforts in the early 1990s. The objective is to provide a year-round downstream connection to the mainstem Yankee Fork. The goal is to increase the quantity and improve the quality of available habitats that will address the habitat quantity and quality limiting factors. Improved perennial, downstream access from the mainstem Yankee Fork into diverse, quality habitat types.</div>			<div>4: Riparian Condition</div> <div>4.2: Large Woody Material Recruitment – loss of mature riparian vegetation and mature trees available for channel recruitment resulting in a decline in habitat complexity.</div>
Flat Rock Area Geomorphic Reach (Yankee Fork RM 3.10-0)					
Flat Rock Area Geomorphic Reach RM 3.10-0	Tier 1	<div>Monitor and Maintain: Protect the highly functioning habitats through this migratory corridor, and maintain or improve water quantity and quality.</div> <div>Focal Species: Chinook salmon, steelhead, bull trout, and westslope cutthroat.</div> <div>Viable Salmonid Population (VSP) Parameters Maintained: Abundance and productivity, and spatial structure and diversity.</div>	<div>Channel Length Impacted: <i>Existing Yankee Fork Channel:</i> 1.95 RM</div> <div>Channel Confinement: <i>Existing Yankee Fork Channel:</i> Confined, bedrock channel</div> <div>Channel Planform: <i>Existing Yankee Fork Channel:</i> Straight</div> <div>Channel Bedform: <i>Existing Yankee Fork Channel:</i> Step-pool</div> <div>Dominant Substrate: <i>Existing Yankee Fork Channel:</i> Bedrock</div> <div>Riparian Condition: <i>Existing Yankee Fork Channel Buffer:</i> 5-30 feet</div> <div>Large Woody Material Recruitment Potential: <i>Existing Yankee Fork Channel:</i> Moderate</div> <div>Floodplain Connectivity: <i>Existing Yankee Fork Channel:</i> Good, where present</div> <div>Access to Peripheral Habitats: <i>Existing Yankee Fork Channel:</i> Moderate, primarily due to instream and channel boundary roughness</div>	Not Applicable	None

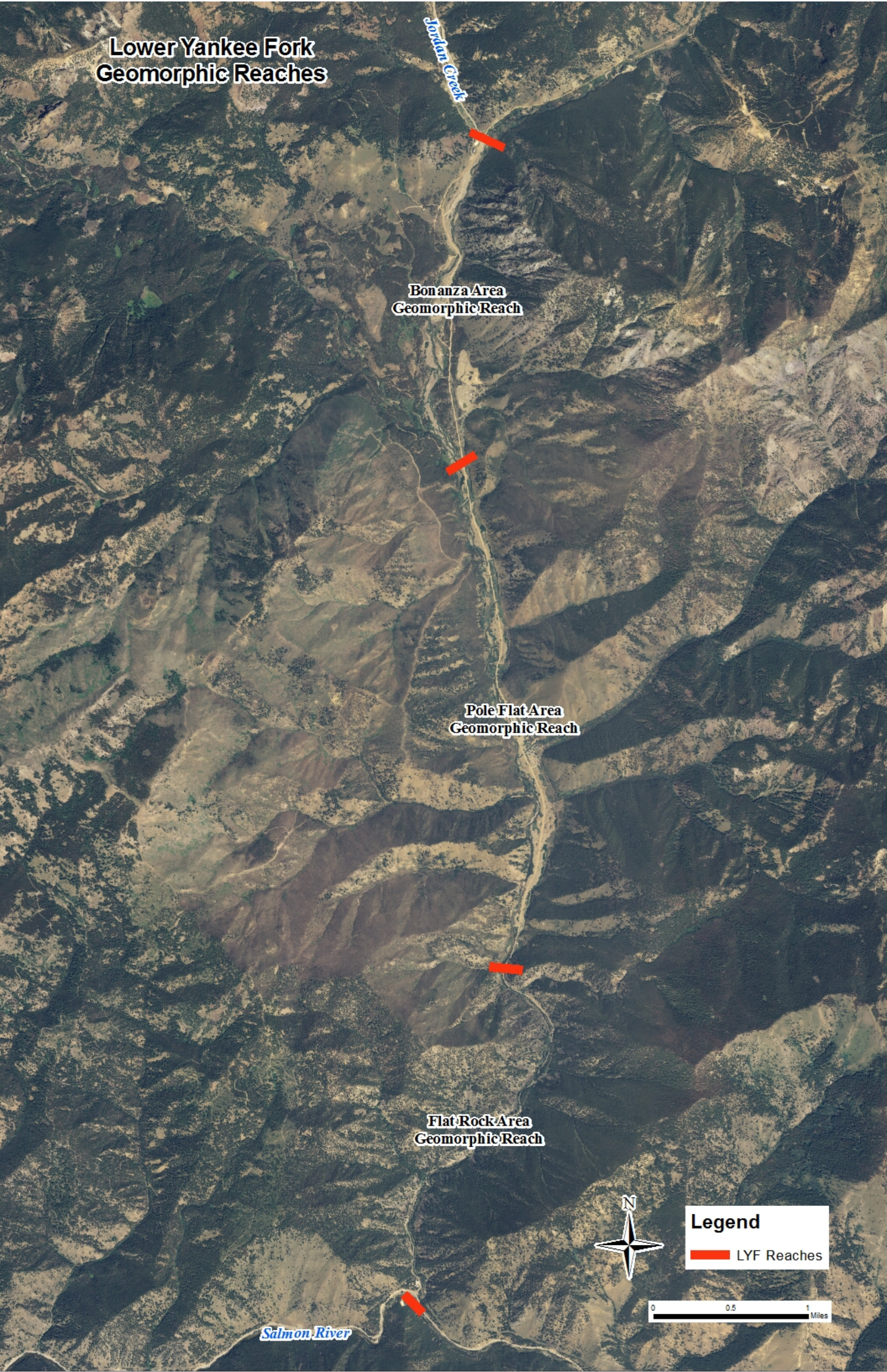


Plate 4. Lower Yankee Fork Reaches.

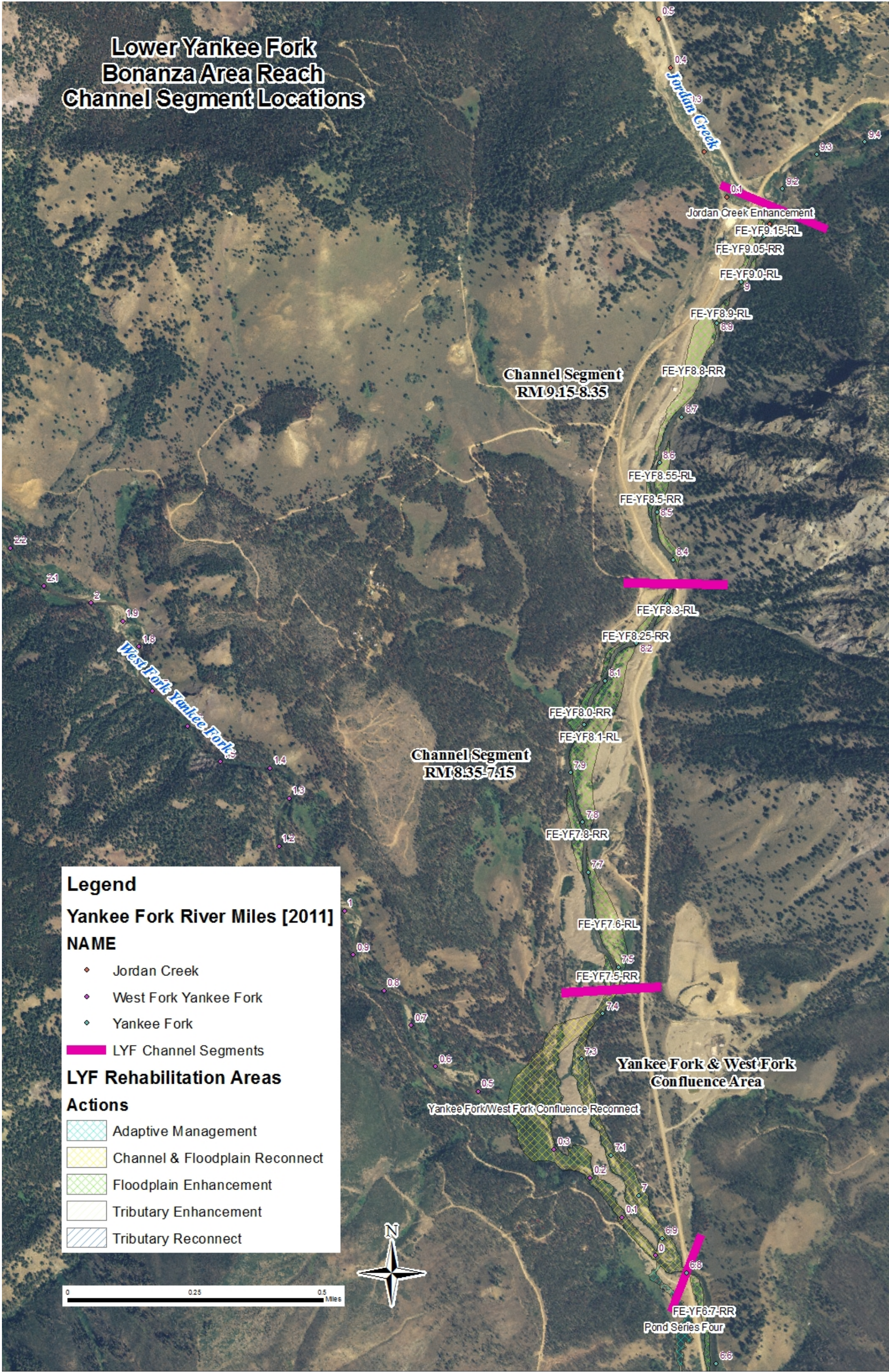


Plate 5. Bonanza Area Reach Channel Segment Locations.

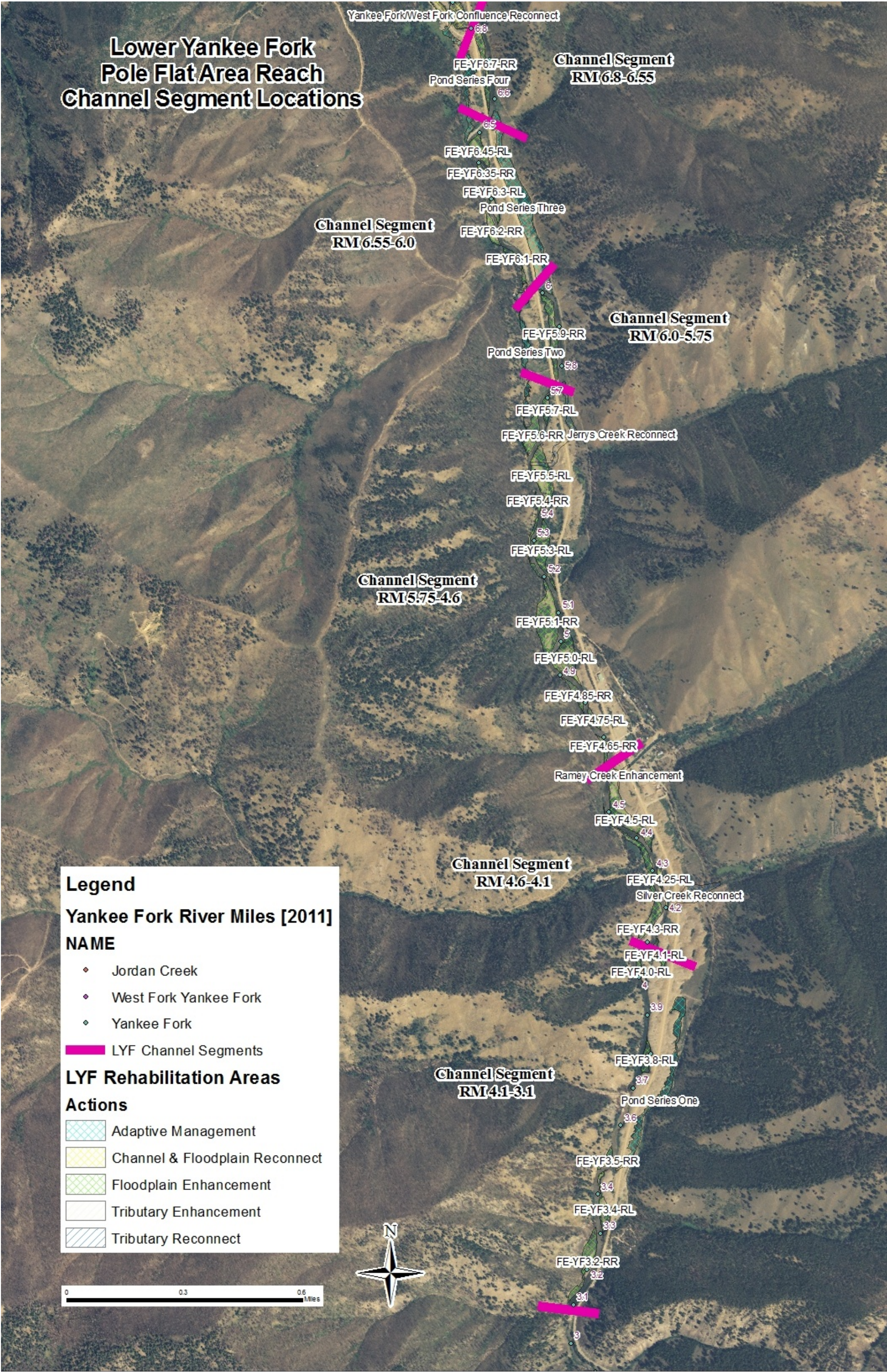


Plate 6. Pole Flat Area Reach Channel Segment Locations.

This page intentionally left blank

LIST OF PREPARERS & REVIEWERS

Name	Organization	Contribution
Edward W. Lyon, Jr., L.G.	Bureau of Reclamation Pacific Northwest Regional Office Boise, Idaho	Principal Author River Systems Analysis Group Geomorphologist
Evelyn Galloway	Shoshone-Bannock Tribes Fish and Wildlife Program Fort Hall, Idaho	Contributing Author/Reviewer Yankee Fork Restoration Project Program Manager
Terril Stevenson, L.G.	Bureau of Reclamation Pacific Northwest Regional Office Boise, Idaho	Peer Reviewer River Systems Analysis Group Manager
Richard Link, L.E.G., L.G.	Bureau of Reclamation Pacific Northwest Regional Office Boise, Idaho	Peer Reviewer Geology and River Systems Analysis Group Program Manager
Dan Stone	Shoshone-Bannock Tribes Fish and Wildlife Program Fort Hall, Idaho	Reviewer Policy Analyst
Sammy Matsaw, Jr.	Shoshone-Bannock Tribes Fish and Wildlife Program Fort Hall, Idaho	ESA Habitat Program Manager
Paul Drury, P.E.	Bureau of Reclamation Pacific Northwest Regional Office Boise, Idaho	Reviewer River Systems Analysis Group Hydraulic Engineer
Bart Gamett	Salmon-Challis National Forest Lost River Ranger District Mackay, Idaho	Reviewer South Zone Fish Program Fisheries Biologist
Caselle Wood	Salmon-Challis National Forest Lost River Ranger District Mackay, Idaho	Reviewer South Zone Fish Program Fisheries Technician
Jerry Myers	Trout Unlimited Salmon, Idaho	Reviewer Upper Salmon Project Manager
Jim Gregory	Lost River Fish Ecology, Inc. Mackay, Idaho	Reviewer Ecologist
Rick Rieber	Bureau of Reclamation Pacific Northwest Regional Office Boise, Idaho	Reviewer Ecosystems Analysis Group Biologist
Kelly Vick	Bureau of Reclamation Pacific Northwest Regional Office Boise, Idaho	Natural Resources Writer Liaison & Coordination Group

LITERATURE CITED

Parentetical Reference	Bibliographic Citation
ISRP 2008	Independent Scientific Review Panel. 2008. Review of the Yankee Fork Floodplain Restoration Project Implementation Plan for 2008 - 2018: Independent Scientific Review Panel for the Northwest Power & Conservation Council, Portland, Oregon.
ISRP 2011	Independent Scientific Review Panel. 2011. Review of the Columbia Habitat Monitoring Program (CHaMP) Protocols: Independent Scientific Review Panel for the Northwest Power & Conservation Council, Portland, Oregon.
NOAA Fisheries 2010	NOAA's National Marine Fisheries Service. 2010. <i>Supplemental Consultation on Remand for Operation of the Federal Columbia River Power System, 11 Bureau of Reclamation Projects in the Columbia Basin and ESA Section 10(a)(1)(A) Permit for Juvenile Fish Transportation Program</i> . May 20, 2010, F/NWR/2010/0209.
Reclamation 2012a	Bureau of Reclamation. 2012a. <i>Yankee Fork Tributary Assessment, Upper Salmon Subbasin, Custer County, Idaho</i> : Department of Interior, Bureau of Reclamation, Pacific Northwest Region, Boise, Idaho, 153 p.
Reclamation 2012b	Bureau of Reclamation. 2012b. <i>Bonanza Area Reach Assessment, Yankee Fork of the Salmon River, Upper Salmon Subbasin, Custer County, Idaho</i> : Department of Interior, Bureau of Reclamation, Pacific Northwest Region, Boise, Idaho, 92 p.
Reclamation 2012c	Bureau of Reclamation. 2012c. <i>Pole Flat Area Baseline Condition Assessment, Yankee Fork of the Salmon River, Upper Salmon Subbasin, Custer County, Idaho</i> : Department of Interior, Bureau of Reclamation, Pacific Northwest Region, Boise, Idaho, 80 p.
Roni, Hanson, and Beechie 2008	Roni, P., Hanson, K., and Beechie, T. 2008. Global review of the physical and biological effectiveness of stream habitat rehabilitation techniques: <i>North American Journal of Fisheries Management</i> , 28, p. 856-890.