6.2.42 Upper Deer Creek

Upper Deer Creek (Figure 6-25) is the next drainage to the east of the Boulder River, and joins the Yellowstone River about one mile upstream of Greycliff, Montana. Upper Deer Creek has three major tributaries, the West, East, and Middle forks. The upper 1/3 of the watershed is within the GNF. Downstream of the forest boundary, ownership is primarily private, although the stream does flow through some state-owned lands and public lands managed by the BLM.

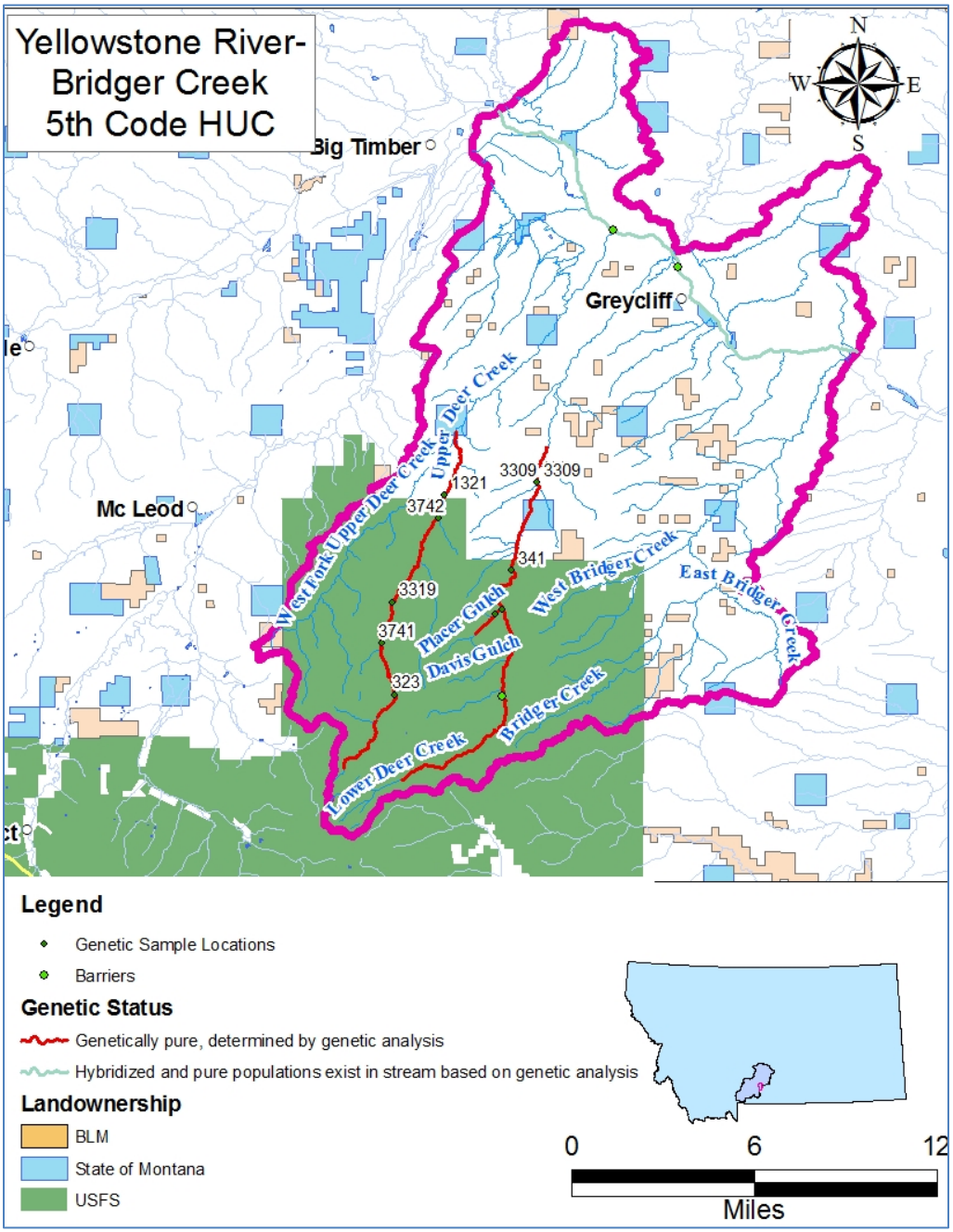

Figure 6-25: Yellowstone River-Bridger Creek 5th order HUC.

Species composition and relative abundance of fishes vary along the length of Upper Deer Creek (Table 6-45). The lower half of the watershed supports nonnative brook trout, brown trout, and rainbow trout, and native mountain whitefish. Yellowstone cutthroat trout are present in the upper half of the main stem of Upper Deer Creek, although brook trout and brown trout outnumber Yellowstone cutthroat trout in most of this reach. All Yellowstone cutthroat trout tested in the upper reaches have been nonhybridized (Table 6-46), making this a core population.

Table 6-45: Distribution and abundance of fishes in Upper Deer Creek (MFISH database).

Begin Mile	*End Mile*	*Species*	*Abundance*	*Use Type*	*Life History*	*Genetic Status*	*Data Rating*
0	21	Brook trout	Common	Year-round resident	N/A	N/A	NSPJ
0	11	Brown trout	Common	Year-round resident	N/A	N/A	EFSSO
0	10	Mountain whitefish	Rare	Year-round resident	N/A	N/A	NSPJ
0	10	Rainbow trout	Unknown	Year-round resident	N/A	N/A	EFSSO
9.7	21	Yellowstone cutthroat trout	Rare	Unknown	Resident	Nonhybridized	NSPJ

Table 6-46: Summary of genetic analyses conducted in Upper Deer Creek (MFISH database). .

Sample No.	*Sample Size*	*Percent*	*Collection Date*	*Target Species*
3741	19	100	07/10/2008	YCT
3742	9	100	07/10/2008	YCT
3319	9	100	10/02/2006	YCT
1321	10	100	08/12/1998	YCT
323	26	100	08/15/1989	YCT

Dominance of nonnative salmonids presents a threat to the persistence of Yellowstone cutthroat trout in the Upper Deer Creek drainage. As a nonhybridized population, securing these fish is consistent with the highest priority for Yellowstone cutthroat trout in Montana (MCTSC 2007). Conservation planning to protect the remaining Yellowstone cutthroat trout in Upper Deer Creek has begun, and implementation of some actions is underway. Suppression of brown trout and brook trout began in 2009, with the goal of reducing pressure on Yellowstone cutthroat trout in the upper watershed.

Construction of a barrier to prevent upstream movement of nonnative fishes is a possible future action. Several potential sites for barrier construction are in the running. A site downstream of the GNF boundary has the advantage of providing many miles of habitat for Yellowstone cutthroat trout; however, the expense of spanning the wide floodplain may be cost prohibitive. One or more sites upstream provide the lateral wall confinement that increases the suitability for

barrier construction, although barriers at these locations would provide considerably less habitat for Yellowstone cutthroat trout. Future planning will include cost and benefit analyses of barrier construction at various sites.

Chemical removal of nonnatives would be the next possible step, and resident Yellowstone cutthroat trout would be salvaged before treatment. The combination of barrier construction and removal of nonnatives, with reintroduction of salvaged Yellowstone cutthroat trout, would result in secured habitat for a locally adapted, nonhybridized population of Yellowstone cutthroat trout.

Historically, Upper Deer Creek potentially supported a spawning run of fluvial Yellowstone cutthroat trout from the Yellowstone River; however, no significant run has been documented in recent times. Chronic dewatering in the lower reaches is likely a limiting factor. Low flows during the summer months relate to irrigation demands, although natural dewatering through subsurface losses is also likely. The rarity of Yellowstone cutthroat trout in the neighboring portions of the Yellowstone River relates in part to a lack of suitable tributary spawning habitat, so finding opportunities to promote in-stream flows would have considerable conservation value. The potential for maintaining flow through the summer months is unknown. FWP will seek opportunities to work with water rights holders in promoting voluntary practices that increase water use efficiency, and allow savings to be left in Upper Deer Creek.

6.2.43 Lower Deer Creek

Lower Deer Creek (Figure 6-25) flows for approximately 25 miles and enters the Yellowstone River near Greycliff, MT. About half of Lower Deer Creek's length is in the GNF. The remainder flows through private lands and one state-owned section.

Fish species present in Lower Deer Creek include brown trout and Yellowstone cutthroat trout (Table 6-47). The MFISH database lists brook trout as potentially being present in the lower portions of stream; however, no survey data are available to confirm this. Although not currently included in MFISH, mottled sculpin are also present, and extend into reaches within the GNF at low numbers.

Table 6-47: Distribution and abundance of fishes in Lower Deer Creek (MFISH database).

Begin Mile	*End Mile*	*Species*	*Abundance*	*Use Type*	*Life History*	*Genetic Status*	*Data Rating*
0	19	Brook trout	Common	Year-round resident	N/A	N/A	NSPJ
0	19	Brown trout	Common	Year-round resident	N/A	N/A	NSPJ
9	24	Yellowstone cutthroat trout	Common	Unknown	Resident	Nonhybridized	EFSSO

Lower Deer Creek is intermittent for several miles before its confluence with the Yellowstone River. Irrigation withdrawals and the presence of a losing reach in the lower miles contribute to a lack of flow during much of the summer. This intermittency presents a partial barrier to fish

movement and limits the potential for a fluvial run of Yellowstone cutthroat trout into Lower Deer Creek. Brown trout dominate the lower reaches and, until recently, brown and Yellowstone cutthroat trout occupied areas from immediately below the GNF boundary extending upstream to a natural barrier waterfall several miles within National Forest. Three fish-bearing tributaries, Placer Gulch, Davis Gulch, and West Fork Lower Deer Creek, are within the National Forest. The lower reaches of these streams are important spawning and rearing areas for Yellowstone cutthroat trout (J.R. Wood, FWP, personal communication).

Lower Deer Creek has been the subject of an extensive Yellowstone cutthroat trout conservation effort that included establishment of replicated populations, barrier construction, Yellowstone cutthroat trout salvage, establishment of replicate populations and piscicide treatment. These actions were the result of discovery of hybrids several miles downstream of the GNF boundary in 2005. These fish were first generation backcrosses (Leary 2006), meaning their grandparents were a nonhybridized Yellowstone cutthroat trout and a rainbow trout. This crossing is typical of early stage of invasion, which spurred FWP and the GNF to action, consistent with the conservation objective of securing nonhybridized populations. Subsequent sampling found rapid upstream invasion of hybridized fish, with hybrids found close to Placer Gulch by 2010 (J.R. Wood, FWP, personal communication).

6.2.44 Bridger Creek

Bridger Creek (Figure 6-25) marks the downstream extent of the upper Yellowstone HUC. Its waters originate on the north flank of the Beartooth Mountains, within the GNF. Most of its length is within private land, although state-owned sections and BLM lands are interspersed throughout the valley portions.

Little information is available on fish species composition and distribution in Bridger Creek. Species presumed present include brook trout, brown trout, and rainbow trout, although no data are available to verify this presumption (Table 6-48). Filling these data gaps is the conservation priority for Bridger Creek. The findings will guide development of conservation plans to restore or secure Yellowstone cutthroat trout in the watershed.

Table 6-48: Distribution and abundance of fishes in Bridger Creek (MFISH database).

Begin Mile	*End Mile*	*Species*	*Abundance*	*Use Type*	*Life History*	*Genetic Status*	*Data Rating*
0	13	Brook trout	Common	Year-round resident	N/A	N/A	NSPJ
13	22	Brook trout	Abundant	Year-round resident	N/A	N/A	NSPJ
0	13	Brown trout	Rare	Year-round resident	N/A	N/A	NSPJ
0	12	Rainbow trout	Rare	Year-round resident	N/A	N/A	NSPJ

Dewatering presents a probable constraint on the fishery in the lower portion of Bridger Creek, and may limit the occurrence of a spawning run of Yellowstone cutthroat trout into this stream. Low flows likely relate to irrigation demands and the losing nature of the stream when it encounters the Yellowstone River alluvium. The feasibility of increasing in-stream flow through implementation of voluntary practices that improve water use efficiency is unknown. FWP will work with interested water rights holders to explore potential projects.

6.2.45 Unmapped Spring Creeks

Near Big Timber, several unmapped spring creeks have potential to provide spawning habitat for fluvial Yellowstone cutthroat trout. These include Esp Spring Creek, Kickabuck Spring Creek, and Milligan Slough. As they maintain adequate flow of cool water throughout the summer months, these streams have potential to provide spawning habitat for fluvial Yellowstone cutthroat trout, and augment fish numbers in this portion of the Yellowstone River. Additional investigation may uncover more streams presenting conservation potential.

Esp Spring Creek was the subject of a restoration project in 1999. Conservation actions included replacement of a perched culvert, installation of riparian fencing and off-channel water, movement of a corral away from the stream, and restoration of 1,000 feet of channel. Yellowstone cutthroat trout fry were imprinted on the stream to establish a spawning run. This imprinting was unsuccessful, as no spawners returned to Esp Spring Creek.

Several factors may have contributed to the failure of Yellowstone cutthroat trout to establish a spawning run in Esp Spring Creek. First, the stream may not have been accessible during the cutthroat trout spawning period. Esp Spring Creek enters the Yellowstone River from a terrace, and drought in subsequent years may have not provided a spring peak of sufficient magnitude to allow fish access to the stream. The available brood stock may also be related to the failure of Yellowstone cutthroat trout to return to Esp Spring Creek. The fry imprinted on the stream were not of a fluvial strain, and may have lacked the genetic predisposition to home to their natal stream. Likewise, conditions in the Yellowstone River may have been unsuitable for fry to survive to reproductive age. Warm water temperatures during continued drought, combined with predation pressure, may have resulted in the demise of imprinted fish.

Potential conservation actions for Esp Spring Creek include investigations into accessibility of this stream during the Yellowstone cutthroat trout spawning period. If Esp Spring Creek is accessible, re-imprinting Yellowstone cutthroat trout from a fluvial strain may be an option to establish a spawning run.

In 2009, another spring creek enhancement project created about 1,400 feet of high quality spawning habitat on Kickabuck Spring Creek, known locally as Thompson Spring Creek. This stream consisted of a relatively straight channel lacking pools and substrate suitable for spawning. Enhancement involved construction of a new channel, which nearly doubled stream

length, and importation of spawning gravel to line the new bed. Imprinting of fry obtained from fluvial brood stock is a potential, future conservation action for Kickabuck Spring Creek.

Milligan Slough is a third spring creek with potential to provide spawning habitat. Currently, much of Milligan Slough is overly wide, and fine sediment dominates the streambed (Endicott 2007). Conservation actions appropriate for this stream would include channel restoration, grazing management, and riparian plantings. FWP will seek opportunities to work with landowners on implementation of conservation activities along Milligan Slough.

6.3 Shields River (HUC 10070003)

The Shields River (Figure 6-26) watershed encompasses approximately 289,000 acres and flows into the Yellowstone River, east of Livingston, Montana. The Shields River valley is primarily agricultural, with irrigated crops, pasture, and rangeland being major land uses. Forest occupies the higher elevations, with timber harvest, livestock grazing, and recreation being common in these areas.

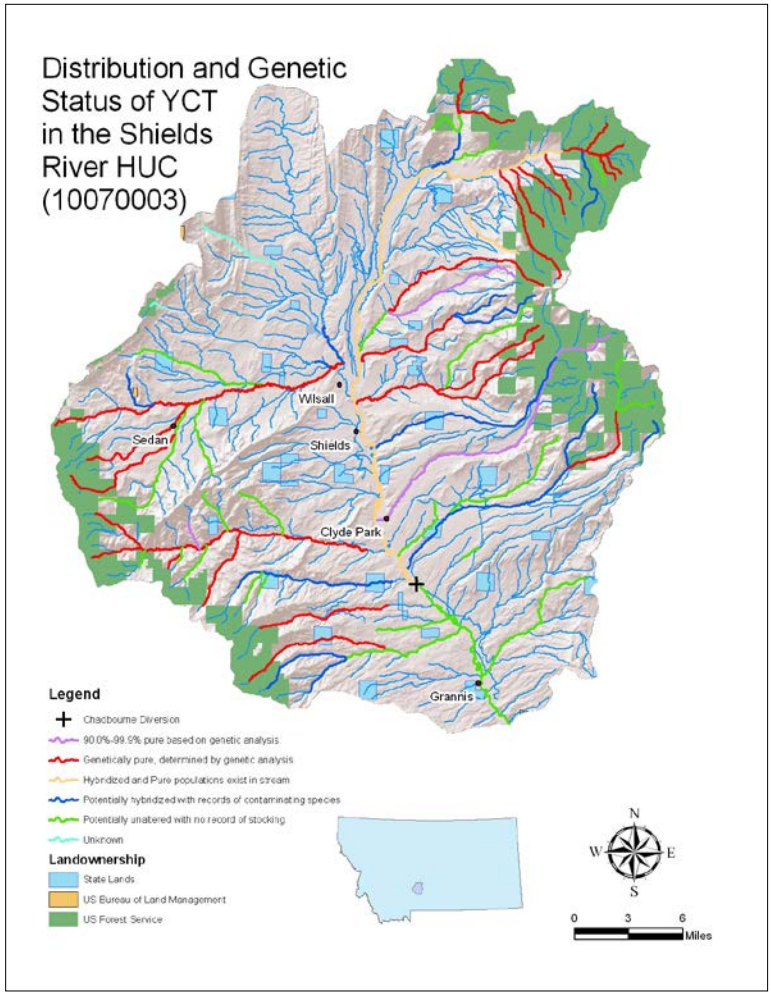

Figure 6-26: Shields River Subbasin (HUC 10020003).