Kickabuck Spring Creek

Initial Project Assessment

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1.0 Introduction

Yellowstone cutthroat trout (*Oncorhynchus clarki bouvieri*), a species native to Montana, has experienced declines in abundance and distribution throughout its historic range. Seeking to reverse this trend on private lands, the Landowner Incentive Program/Yellowstone Cutthroat Trout project (LIP/YCT) assists private landowners seeking to improve habitat for Yellowstone cutthroat trout on their property. This report, or project assessment, documents preliminary evaluations for potential projects on Kickabuck Spring Creek. The objectives of the project assessment are to describe relevant literature and data, describe existing conditions and potential, and provide recommendations to landowners. If landowners agree to proceed with conservation activities, Montana Fish, Wildlife & Parks' Yellowstone cutthroat trout restoration biologist will provide technical, financial, and planning assistance to implement restoration activities on these private lands.

2.0 Project Background

Kickabuck Spring Creek is a small, unmapped stream originating in the floodplain of the Yellowstone River downstream of the confluence with the Boulder River near Big Timber, Montana (Figure 2-1). Kickabuck Spring Creek emerges along a bench in a sedge (*Carex* sp.) meadow, and flows for about 0.4 miles before its confluence with the Yellowstone River. Subsurface irrigation returns and connectivity with the Boulder and Yellowstone River alluvial aquifers are responsible for flows in this stream, although the relative contributions of each are not known.

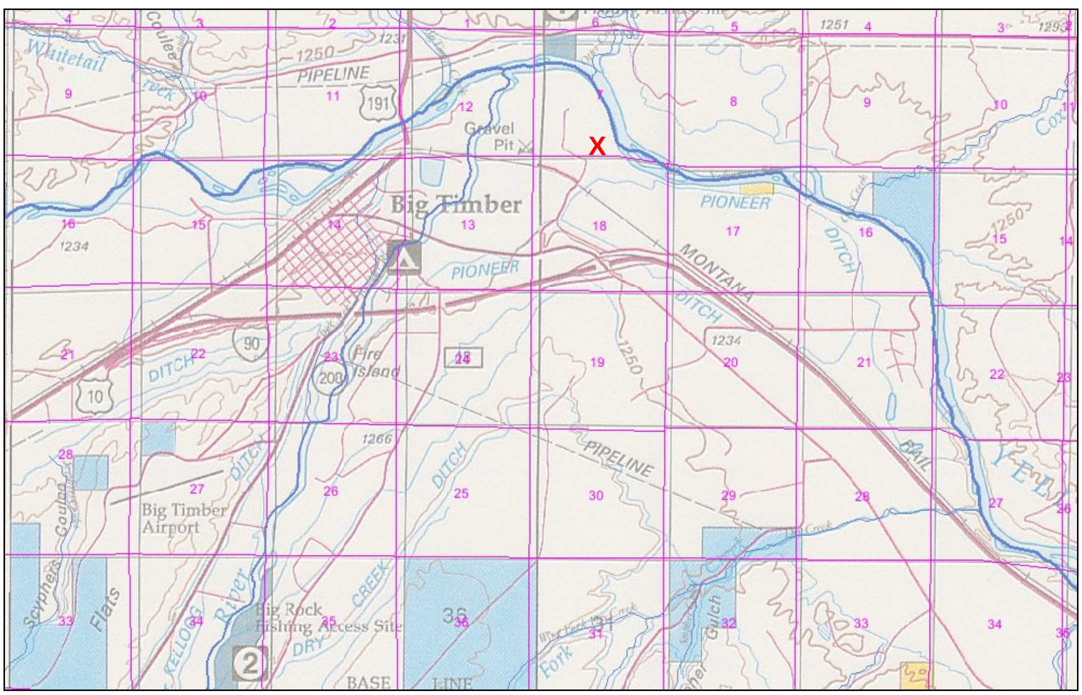

Figure 2-1: Overview map showing location of Kickabuck Spring Creek. The red X marks the project site.

FWP fisheries biologists Jim Olsen and Carol Endicott visited the site on two occasions to evaluate potential projects to benefit Yellowstone cutthroat trout. Landowners Robert and Julie Zaideman and Skip Herman were present for the second visit. Their goals for their property include enhancing spawning opportunities for Yellowstone cutthroat trout, while conserving or improving existing habitat for waterfowl and other species of wildlife. Land uses will be mostly recreational; however, some level livestock grazing will likely continue on the property.

3.0 Fisheries Data Review

Fisheries information germane to potential projects on Kickabuck Spring Creek include reports detailing the status Yellowstone cutthroat trout in the larger watershed, and the role of spring creeks as a source of recruitment of fish to the Yellowstone River. No fisheries information specific to Kickabuck Spring was available, as until recently, Kickabuck Spring Creek has escaped the attention of the natural resource community. Its small size and apparent seasonality of flow contribute to its absence from maps and fisheries investigations. Nonetheless, restoration projects on similar spring creeks suggest such streams may be an important component of Yellowstone cutthroat trout conservation.

The Yellowstone cutthroat trout has declined substantially across its range. Range wide, Yellowstone cutthroat trout occupy 43% of their historic stream miles, but only 24% of historic habitat in Montana still supports Yellowstone cutthroat trout (May et al. 2007). A variety of factors have contributed to a significant decline in the distribution and abundance of Yellowstone cutthroat trout across their range and in Montana, including introduction of non-native salmonids, construction of migration barriers, dewatering in tributaries, which limits recruitment, and habitat degradation. The current, prolonged drought is putting additional strain on remaining populations.

In Montana, Yellowstone cutthroat trout show a trend of increasing rarity from its stronghold in the upper Yellowstone River and Shields River hydrologic units proceeding east (Figure 3-1). Yellowstone cutthroat trout historically occupied suitable habitat in Montana from the headwaters in the upper Yellowstone River basin to below Billings, Montana. Downstream of the Shields River watershed, most Yellowstone cutthroat trout are now present as disjunct populations relegated to headwater streams.

Although Yellowstone cutthroat trout are present in the Yellowstone River below Livingston, numbers have diminished substantially over the past few years. Sampling reaches at Springdale and Big Timber allow inference on status of riverine populations near the project site. In 1999, an estimated 180 Yellowstone cutthroat trout per mile occurred in the Yellowstone River near Springdale, Montana, the nearest sampling reach to Kickabuck Spring Creek (Tohtz 2003). These numbers dropped throughout the early 2000s with estimates of less than 50 Yellowstone cutthroat trout per mile in 2003 and 2004 (Tohtz 2003, Opitz 2005). Too few fish were captured in 2006 to allow calculation of a population estimate (Opitz 2007). The sampling reach at Big Timber showed a similar trend with over 200 Yellowstone cutthroat trout per mile in 1999 (FWP 2007); however, Yellowstone cutthroat trout were so rare in 2007 that calculation of a population estimate was not possible (Jim Olsen, FWP, personal communication). Extended drought was attributed as the likely cause of the continued decline and results in concern for the persistence of Yellowstone cutthroat trout in this reach of the Yellowstone River.

Increasing reproduction of Yellowstone cutthroat trout in the Yellowstone River downstream of Livingston is desirable, and spring creeks are among the habitats used for spawning and rearing (Shepard 1992, Roberts 1988, Clancy 1988, DeRito 2004). Recent monitoring on Emigrant Spring Creek, a system similar to Kickabuck Spring Creek, provides justification for improvements on Kickabuck Spring Creek. Yellowstone cutthroat trout and rainbow trout made only sporadic use of Emigrant Spring Creek as a spawning stream during the 1970s and 1980s, and always in low numbers (Berg 1975, Clancy 1984, Clancy 1985). A suite of restoration actions aimed at improving instream habitat and maintaining flows occurred in 2004. Monitoring in 2007 found at least nine redds, with most likely the product of more than one spawning pair (Endicott 2007). These results showed marked improvement in conditions in the 1970s through 1990s, and suggested increased recruitment of Yellowstone cutthroat trout from Emigrant Spring Creek. Moreover, this level of spawning so soon after restoration is promising and the run is likely to grow over time.

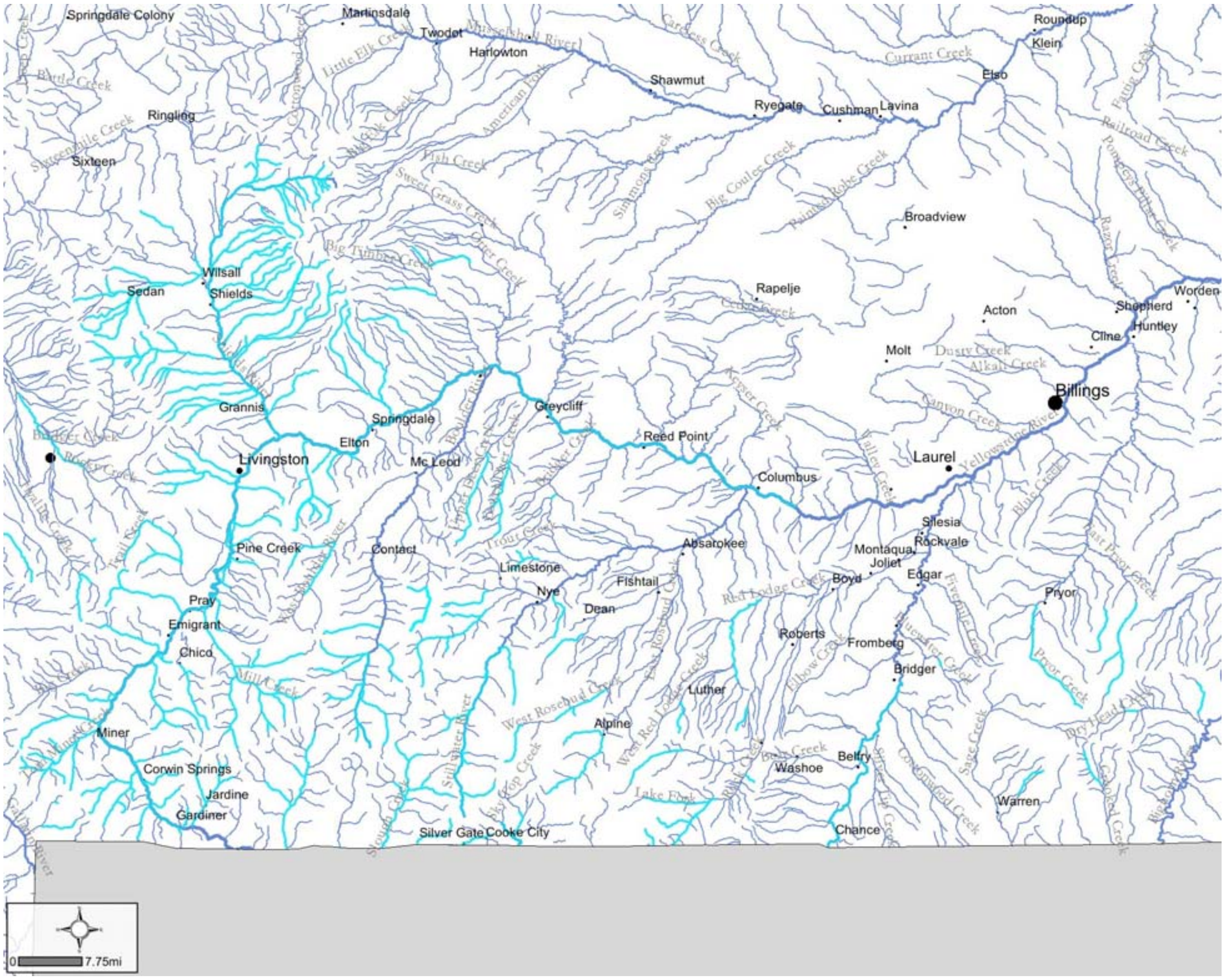

Figure 3-1: Distribution of Yellowstone cutthroat trout in the Yellowstone River watershed, Montana. Streams known or presumed to support Yellowstone cutthroat trout are in aqua.

4.0 Site Visit

Two surface water features occur on the Kickabuck Spring Creek property. Kickabuck Spring Creek emerges alongside the terrace on the south side of the Yellowstone River's floodplain (Figure 4-1). A linear pond occupies an abandoned side channel of the Yellowstone River, and provides substantial habitat to waterfowl.

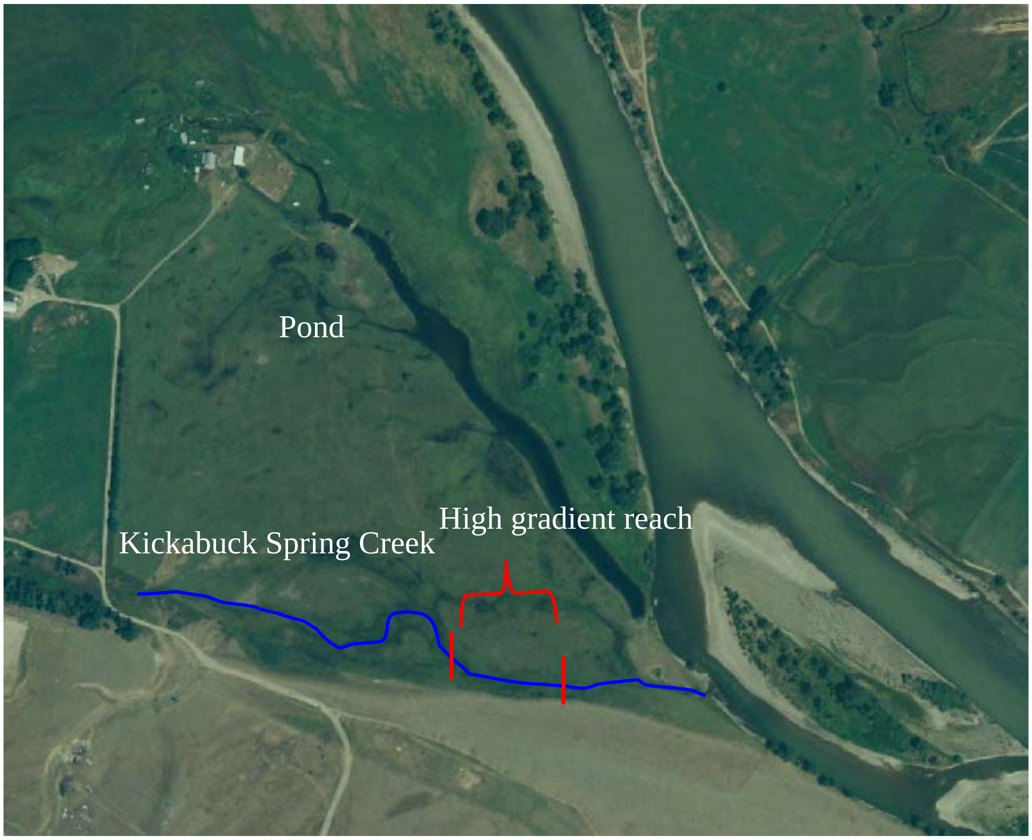

Figure 4-1: Aerial view of the Kickabuck Spring Creek property.

Conditions vary somewhat along the course of Kickabuck Spring Creek. For much of its length, Kickabuck Spring Creek has a relatively narrow and deep channel, consistent with Rosgen's E channel classification (Rosgen 1996, Figure 4-2). In its upstream third of length, channel integrity is limited, as the stream becomes more of an emergent wetland without a defined channel. Where a discrete channel exists, it is uniformly stable, with no bank erosion occurring.

Figure 4-2: Typical view of Kickabuck Spring Creek channel showing dense sedge mats.

Steepness or gradient is also variable across Kickabuck Spring Creek. A reach delineated on Figure 4-1 is relatively steep, and may provide an opportunity to increase stream length with excavation of meanders. In other areas, valley slope is gentle and contributes to dominance by marsh, rather than a stream channel.

Substrate composition relates to local gradient and channel morphology in Kickabuck Spring Creek. Where steeper gradients exist, gravel dominates the streambed (Figure 4-3). In other locations, the gentle slope and slightly wider channel geometry favors deposition of fine sediment (Figure 4-4). The presence of gravel in the channel is promising, as this suggests it may not be necessary to import gravel from an outside source.

Figure 4-3: Gravel dominated substrate present in localized areas in Kickabuck Spring Creek.

Figure 4-4: Deposition of fine sediment in a portion of Kickabuck Spring Creek.

The substantial influence of groundwater upwelling is a prominent feature of this site. A wetland comprised of a dense stand of sedges occupies most of the ground between Kickabuck Spring Creek and the neighboring pond. An advantage of this volume of groundwater is that is relatively cool, even during summer. Despite being the hottest July on record, temperature in Kickabuck Spring Creek was low on July 27, 2007 and likely within the optimal range for cold-water fishes such as Yellowstone cutthroat trout.

Groundwater inputs are from three potential sources. Return flows from lands irrigated on the bench above Kickabuck Spring Creek are one potential source. Examination of aerial imagery suggests connectivity with the Boulder and Yellowstone rivers' alluvial aquifers also contributes flow (Figure 4-5). The source of the water is important as it relates to seasonality of flows in Kickabuck Spring Creek. If irrigation return flows are the primary source, stream flows in Kickabuck Spring Creek should be low until onset of the irrigation season in mid-May. This may benefit Yellowstone cutthroat trout, as they spawn after rainbow trout in late June through early July (DeRito 2004). Flows were sufficient on the August 29 field visit to move any emerging fry to the Yellowstone River. Sufficiency of flows to support a resident fishery year round, or a brown trout spawning run, is unknown.

Figure 4-5: Aerial photo of the area contributing to Kickabuck Spring Creek.

In its current configuration, the pond on the Kickabuck Spring Creek property provides habitat for waterfowl, but not cold-water fish (Figure 4-6). The pond heats considerably during the day, but is not deep enough for thermal stratification that would provide a cool refuge at depth. The landowners reported seeing suckers, but no trout.

Figure 4-6: Linear pond on the Kickabuck Spring Creek property.

5.0 Conclusions and Recommendations

Several factors make Kickabuck Spring Creek an ideal candidate for projects aimed at increasing Yellowstone cutthroat trout populations in the Yellowstone River. An abundance of cool water, at least from late spring through late summer, provides suitable conditions for spawning, incubation of eggs, and ultimate transport of fry to the Yellowstone River. Kickabuck Spring Creek also appears to have substrate appropriate for spawning salmonids with construction of a channel capable of transporting fines. Given the decline in Yellowstone cutthroat trout in the Yellowstone River downstream of Livingston, creating a spawning stream would likely contribute to the reversal of this disturbing trend.

Several options exist for improving suitability of spawning habitat in Kickabuck Spring Creek (see Figure 5-1 for conceptual approaches). The simplest approach would be to enhance the existing channel and create a defined channel in the marshy areas to increase overall channel length and improve sediment transport to promote clean gravels. Another option is to decrease the surface area of the linear pond, and route the surplus water through a constructed channel, which would increase length of habitat available for spawning. The remainder of the pond could be converted to emergent wetland, thereby retaining wetland function and wildlife values. A third option is to construct a channel that would capture flows from across the floodplain into a larger channel.

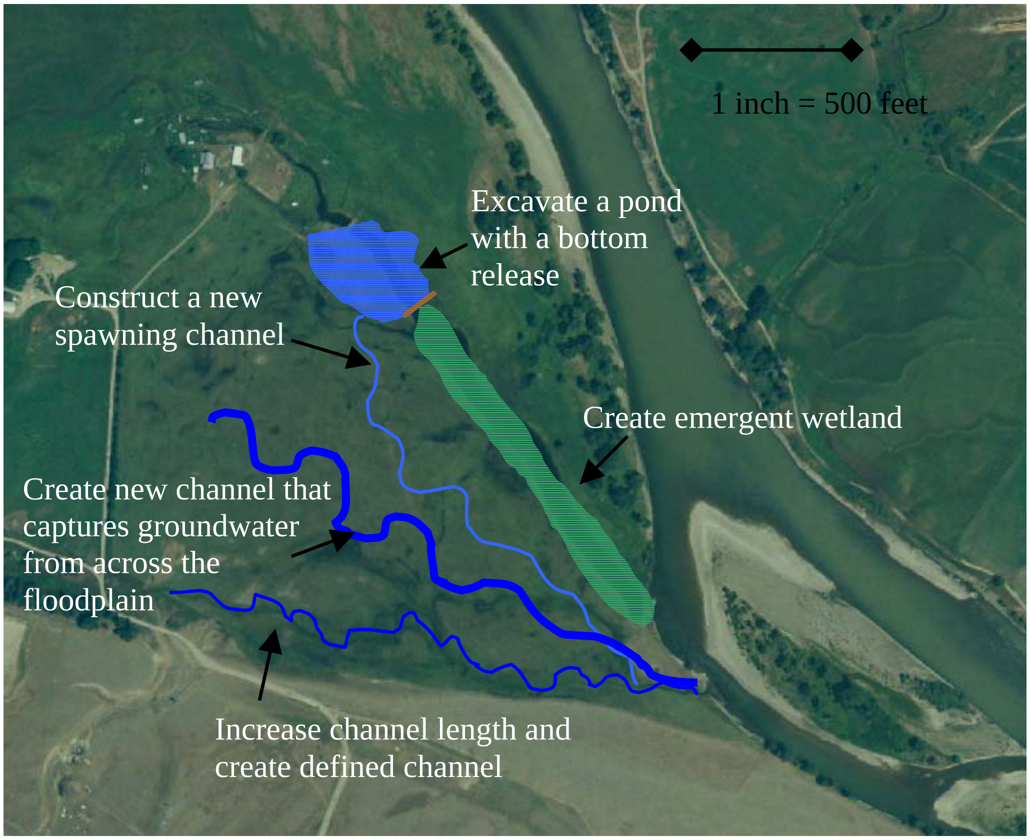

Figure 5-1: Conceptual approach to providing suitable spawning habitat in Kickabuck Spring Creek.

Several unknowns limit the ability to develop a more detailed design and cost estimates for the various options. Expanding the understanding of groundwater/surface water interactions is a logical first step. This involves measuring stream flow at key periods throughout the year and installing piezometers, which allow measurement of groundwater elevations. Surveying elevations throughout the floodplain would further guide design by allowing design of a channel of appropriate length given the valley slope. Confirming the availability of suitable sized gravels through test pits is another action for this phase. FWP's Yellowstone cutthroat trout biologist would prepare grants to fund data collection and design. Once an option is selected, the Yellowstone cutthroat trout biologist would pursue funds for construction.

Although this property will emphasize recreational uses and wildlife, livestock grazing can be a useful complement in managing riparian areas. The Natural Resources Conservation Service (NRCS) works with private landowners on developing grazing management plans to meet the landowner's objectives, while conserving riparian health and function. Table 5-1 lists a number of best management practices (BMPs) used in managing livestock around streams. The Yellowstone cutthroat trout restoration biologist would also facilitate development of a grazing management plan through the NRCS.

Following completion of conservation actions on Kickabuck Spring Creek, the next step would be to expedite a run of Yellowstone cutthroat trout. Given the low numbers of

Yellowstone cutthroat trout in this portion of the river, they would be unlikely to establish a run on their own. FWP uses remote site incubators stocked with eye eggs (Figure 5-2). The resulting fry would imprint on Kickabuck Spring Creek and return to spawn when sexually mature.

Table 5-1: Grazing BMPs to promote riparian health and function (DNRC 2004 and NRCS 2001)

BMP and Management Techniques
Create riparian buffer exclosures through fencing.
Design a grazing management plan and determine the intensity, frequency, duration, and season of grazing to promote desirable plant communities and productivity of key forage species.
Maintain adequate vegetative cover to prevent accelerated soil erosion, protect stream banks, and filter sediments. Set target grazing use levels to maintain both herbaceous and woody plants. No grazing unit should be grazed for more than half the growing season of key species.
Ensure adequate residual vegetative cover and re-growth and rest periods. Periodically rest or defer riparian pastures during the critical growth period of plant species.
Distribute livestock to promote dispersion and decomposition of manure and to prevent the delivery of manure to water sources.
Establish riparian buffer strips of sufficient width and plant composition to filter and take up nutrients and sediment from concentrated animal feeding operations.
Alternate a location's season of use from year to year. Early spring use can cause trampling and compaction damage when soils and stream banks are wet. If possible, develop riparian pastures to be managed as a separate unit through fencing.
Provide off-site high quality water sources.
Periodically rotate feed and mineral sites.
Place salt and minerals in uplands, away from water sources (ideally ¼ mile from water to encourage upland grazing).
Keep salt in troughs and locate salt and minerals in areas where soils are less susceptible to wind or water erosion.
Monitor livestock forage use and adjust strategy accordingly.
Create hardened stream crossings.
Encourage the growth of woody species (willow, alder, etc.) along the stream bank, which will limit animal access to the stream and provide root support to the bank.

Figure 5-2: Remote site incubator used to imprint fry on a natal stream.

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