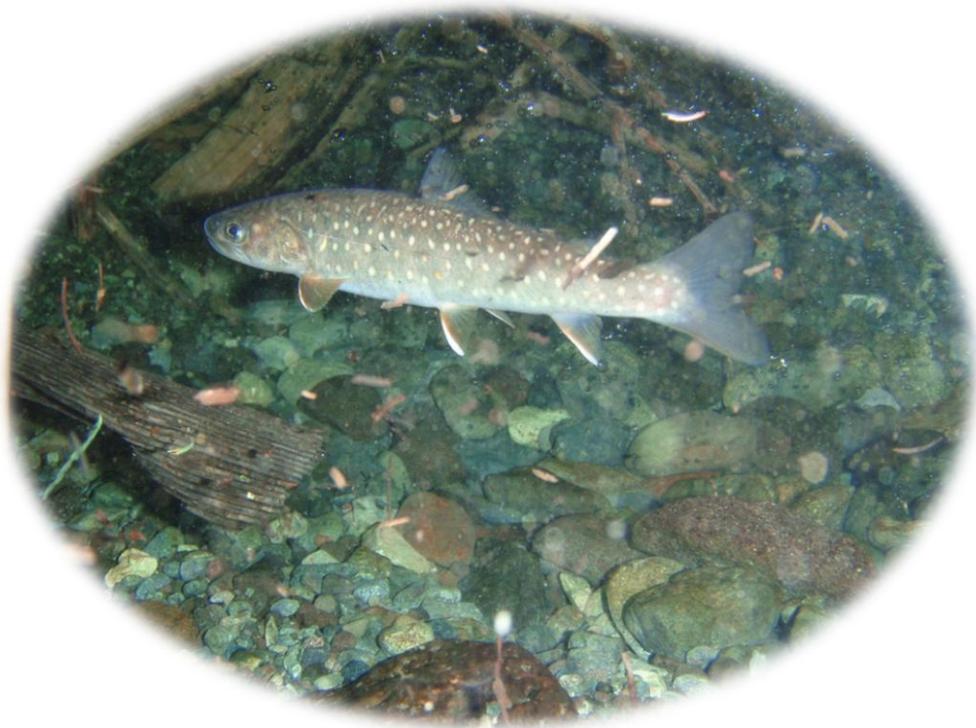


**Management Indicator Species
Fisheries Monitoring Report
West Zone Fisheries**



**Council Ranger District
Payette National Forest
August 2010
Prepared By: Cindy Adams**

TABLE OF CONTENTS

LIST OF FIGURES	3
LIST OF TABLES	4
INTRODUCTION	5
METHODS	6
RESULTS	7
DISCUSSION	8
<i>MIS Bull trout Monitoring</i>	8
<i>Brook trout Monitoring</i>	12
<i>Stream Temperature Monitoring</i>	13
REFERENCES	14
APPENDIX A. Maps	15
APPENDIX B. MIS Survey Protocol	22
APPENDIX C. Snorkel Data Form	26
APPENDIX D. Historical Data	28

LIST OF FIGURES

Figure 1. Upstream view of Indian Creek start location of snorkel survey, August 10, 2010.	9
Figure 2. Upstream view of Indian Creek end location of snorkel survey, August 10, 2010.	9
Figure 3. Upstream view of Camp Creek start of reach surveyed, August 10, 2010.	10
Figure 4. Downstream view of Camp Creek end of reach surveyed, August 10, 2010.	10
Figure 5. Upstream view of Little Weiser River start location of snorkel survey, August 11, 2010.	11
Figure 6. Upstream view of Little Weiser River end location of snorkel survey, August 11, 2010.	12
Figure 7. The 6th HUC watersheds surveyed for Bull Trout and Brook Trout within the West Zone of the Payette National Forest, including survey locations from 2010.	16
Figure 8. The Indian Creek and Bear Creek watersheds and MIS Bull trout survey locations.	17
Figure 9. The East Fork Weiser River watershed and MIS Bull trout survey locations.	18
Figure 10. Crooked River watershed and MIS Bull trout survey location.	19
Figure 11. The Upper Little Weiser and Anderson Creek watersheds and MIS Bull trout survey locations.	20
Figure 12. The Upper Little Weiser River and Anderson Creek watersheds and the Brook trout survey locations.	21

LIST OF TABLES

Table 1. Results from the 2010 MIS Bull trout snorkel surveys.	7
Table 2. Fish count results from the 2010 Brook trout snorkel surveys.	8
Table 3 (a,b). Historical MIS snorkel results from 2004-2010.	29
Table 4 (a,b,c). Historical results of Brook trout monitoring from 1999- 2010.	31

INTRODUCTION

Bull trout (*Salvelinus confluentus*) require cold water, clean gravels, and complex and connected habitats to thrive. Stream temperature are ideally not greater than 13°C. Silt free substrate is required for egg incubation and juvenile rearing. Physical habitat requirements include a diversity of riffle gradients and pool depths and sizes, large woody debris in the wetted channel, and undercut banks. Connection between large rivers and headwater streams is important for spawning and feeding migration.

Impacts to Bull trout include degradation and loss of habitat and hybridization with and displacement by non-native trout. Stream quality is compromised by various land use activities that impair Bull trout habitat. Logging, forest roads, and livestock grazing contribute sediment to streams, decrease canopy cover, and compromise stream bank integrity. Improperly placed culverts can become fish passage barriers and break connectivity between large rivers and headwater streams. Introduction of non-native fish has also impacted Bull trout populations. Brook trout, native to Eastern United States streams, has been introduced to Pacific Northwest streams for sport fishing. Brook trout can survive in warmer waters, are more aggressive foragers, and grow at a quicker rate than Bull trout. Genetically pure populations of Bull trout are threatened from Brook trout-Bull trout hybrids.

In 1999, Bull trout were listed as a threatened species in the Pacific Northwest. This designation aids in the protection and management of habitats Bull trout depend on for survival. The Payette National Forest (PNF) contains good Bull trout habitat where Bull trout are present. Bull trout have been designated as a Management Indicator Species (MIS) in the PNF Land and Resource Management Plan (USFS 2003). The National Forest Management Act requires trends in MIS viability be monitored and related to habitat conditions across the Payette National Forest (Burns et al. 2005). To comply with the Land and Resource Management Plan and the National Forest Management Act, the Council Ranger District of the PNF performs annual surveys of Bull trout in select streams.

Brook trout have been observed in the Little Weiser River and Anderson Creek since 2000. As previously mentioned, the invasion of Brook trout can compromise Bull trout populations. Genetically pure populations of Bull trout exist in Anderson Creek and Sheep Creek (Adams 1994, Spruell 2000). However, hybridization between local populations in the Little Weiser River has been observed and threatens the Anderson Creek and Sheep Creek Bull trout populations. Brook trout are monitored so that their potential invasion into Bull trout habitat can be detected if it occurs.

This report contains the results of Bull trout monitoring on Upper Little Weiser River, Anderson Creek, Crooked River, Bear Creek, Indian Creek, and East Fork Weiser River. Also included in this report are the results of Brook trout monitoring on Little Weiser River, Anderson Creek, and Sheep Creek. Bull trout and Brook trout populations were assessed using snorkel surveys performed by trained technicians.

METHODS

MIS Monitoring - Bull Trout Protocol

Monitoring sites were chosen by a fisheries biologist for streams where known populations of Bull trout exist: Anderson Creek, Upper Little Weiser River, East Fork Weiser River, Indian Creek, Bear Creek, and Crooked River. Figure 7 (Appendix A) presents the locations of all survey sites within 6th HUC watersheds. Location and survey of sites was performed according to MIS Survey Protocol for Council Ranger District (Appendix B) with the exception of Dewey Creek which was surveyed in the same location as the 2009 MIS monitoring site (Greenway and Zurstadt 2009). The location of each survey site was identical, or within 50 meters, to the locations surveyed in past monitoring years. Survey reaches were 100m in length. One fisheries technician snorkeled the reach and identified fish by species and size class (<100mm, 100-200mm, 200-300mm, > 400mm). A second fisheries technician recorded fish data, reach length, water and air temperature, average wetted channel width, maximum pool depth, and percent riffle and pool habitat types. If no Bull trout were observed in a designated section, additional sites were snorkeled (see Appendix B for selection protocol). A sample data sheet is presented in Appendix C. Raw data sheets are on file at the Council Ranger District office and copies will be on file at the Payette National Forest Supervisors office in McCall.

Brook Trout Monitoring Protocol

Monitoring sites were determined by a fisheries biologist in streams where Brook trout threaten Bull trout: Little Weiser River and Anderson Creek. The sites surveyed in 2010 were identical to the 2009 sites, minus one Sheep Creek site. Snorkeling methods, data collection, and photograph documentation was identical to the methods used for the Bull trout survey above with two exceptions: 1) One or two divers were used depending on stream width, and 2) no additional sites were snorkeled if no Brook trout were present.

RESULTS

MIS Monitoring - Bull Trout

Bull trout were observed in all snorkeled sites (Table 1). No additional survey sites were required. Brook trout were observed in East Fork Weiser River, Crooked River and Little Weiser River. Bull trout-Brook trout hybrids were observed in Indian Creek, Camp Creek, East Fork Weiser River, Crooked River, Little Weiser River, and Bear Creek. Locations of survey sites are presented in Figures 7-11, Appendix A. MIS monitoring results from 2004 through 2010 are in Appendix D, Table 3 (a,b).

Table 1. Results from the 2010 MIS Bull trout snorkel surveys.

Stream Name	Location UTM	Date	Bull Trout	Brook Trout	Redband Trout	Hybrid	Other
Indian Creek	11T 0530234 4997912	10-Aug	28	0	0	1	0
Camp Creek	11T 0529680 4997618	10-Aug	23	0	0	1	0
East Fork Weiser River	11T 0558420 4958025	9-Aug	2	9	0	1	A, B (1)
Dewey Creek	11T 0557383 4959624	5-Aug	31	0	0	0	0
Crooked River	11T 0522785 4967512	10-Aug	6	13	0	2	A, B (3)
Little Weiser River	11T 0561322 4940216	11-Aug	15	1	18	3	0
Anderson Creek	11T 0563336 4936372	11-Aug	25	0	0	0	0
Sheep Creek	11T 0562120 4932388	11-Aug	7	0	26	0	B (2)
Bear Creek	11T 0535660 4996854	10-Aug	5	0	0	1	0

A-Tailed frog eggs observed
B- YOY observed (count)

Brook Trout Monitoring

Brook trout were observed in 2 reaches of Little Weiser River and 2 reaches of Anderson Creek (Table 2). Bull trout were observed in Anderson Creek. Locations of survey sites are presented in Figure 12, Appendix A. Monitoring results from 1999 to 2010 are in Appendix D, Table 4 (a,b,c).

Table 2. Fish count results from the 2010 Brook trout snorkel surveys.

Stream Name	Site	Location UTM	Date	Bull Trout	Brook Trout	Redband Trout	Hybrid	Other
Little Weiser River	1	11T 0559862 4929623	11-Aug	0	0	63	0	A(1), B(9)
Little Weiser River	2	11T 0559992 4930052	11-Aug	0	0	52	0	B(11)
Little Weiser River	3	11T 0560066 4930899	9-Aug	0	1	54	0	A(3), B(17)
Little Weiser River	4	11T 0559993 4931983	9-Aug	0	2	57	0	B(3)
Anderson Creek	5	11T 0560145 4930713	11-Aug	0	0	49	0	B(8)
Anderson Creek	6	11T 0561008 4931615	11-Aug	0	0	55	0	B(1)
Anderson Creek	7	11T 0561265 4931906	10-Aug	0	1	52	0	A(1), B(37), C(1)
Anderson Creek	8	11T 0561634 4932380	10-Aug	0	1	30	0	A(1), B(9)
Anderson Creek	9	11T 0562455 4932620	10-Aug	3	0	19	0	B(13)
Sheep Creek	10	11T 0561898 4932438	10-Aug	0	0	7	0	B(1)

A-Tailed frog eggs observed (count)
 B- YOY observed (count)
 C-Tailed frog tadpole observed (count)

DISCUSSION

MIS - Bull Trout Monitoring

Bull trout were observed at all monitored sites in 2010. Brook trout were observed in East Fork Weiser, Crooked River, and the Little Weiser River. Brook-Bull trout hybrids were observed in Indian Creek, Camp Creek, East Fork Weiser River, Crooked River, Little Weiser River, and Bear Creek. Redband trout were observed in the Little Weiser River and Sheep Creek. Since 2004, when MIS monitoring for Bull trout began, an overall increase in Bull trout populations has occurred in most streams except for Bear Creek (Appendix D, Table 3). Details of each surveyed reaches are presented below.

Indian Creek had a water temperature of 7.5°C when snorkeled at 12:00 on August 10, 2010. The start of this site was approximately 70m downstream of the survey location from 2009. A total reach length of 100m was snorkeled. The stream had an average wetted width of 3.4m and a maximum pool depth of 0.5m. A total of 28 Bull trout were observed with majority of length class 100mm-199mm. One Brook-Bull trout hybrid was observed. Figures 1 and 2 present the habitat surveyed.



Figure 1. Upstream view of Indian Creek start location of snorkel survey, August 10, 2010.



Figure 2. Upstream view of Indian Creek end location of snorkel survey, August 10, 2010.

Camp Creek had a water temperature of 9°C when snorkeled at 15:00 on August 10, 2010. A total reach length of 100m was snorkeled. The stream had an average wetted width of 2.9m and a maximum pool depth of 0.65m. A total of 23 Bull trout were observed with majority of length class 100mm-199mm. Figures 3 and 4 present the habitat surveyed.



Figure 3. Upstream view of Camp Creek start of reach surveyed, August 10, 2010.



Figure 4. Downstream view of Camp Creek end of reach surveyed, August 10, 2010.

East Fork Weiser River was snorkeled twice and used as a training section on August 9, 2010. A total reach length of 100m was snorkeled by two divers in tandem to aid fish detection and identification. The water temperature was 7°C at 11:30 and increased to 9°C by 13:45. The average wetted width was 3.15m with a maximum pool depth of 1.2m. Total fish counts were identical on both passes with one fish being identified as a Brook trout on the first pass and a hybrid on the second pass. Two Bull trout, 8 Brook trout, and 2 hybrids were observed in the surveyed section. No photographs were obtained.

Dewey Creek was snorkeled twice and used as a training section on August 5, 2010. A total reach length of 100m was snorkeled on each pass. Water temperature was recorded as 7°C at 11:17 and 8°C at 13:33. The average width and maximum pool depth were not recorded. A total of 31 Bull trout were observed with majority of length class 100mm-199mm. No photographs were obtained.

Crooked River was snorkeled on August 10, 2010. A total reach length of 100m was snorkeled. The stream temperature was 7.5°C at 10:30. The average stream width was 2.2m and maximum pool depth was 0.6m. A total of 6 Bull trout, 13 Brook trout, and 2 hybrids were observed in the reach. The majority length class of all species was 100mm-199mm. No photographs were obtained.

The Little Weiser River was snorkeled on August 11, 2010. A total reach length of 100m was snorkeled. The stream temperature was 8.5°C at 11:20. The average stream width was 4.5m and maximum pool depth was 0.81m. A total of 15 Bull trout, 1 Brook trout, 3 hybrids, and 18 Redband trout were observed in the reach. The majority length class of all species was 100mm-199mm. Figures 5 and 6 present the habitat surveyed.

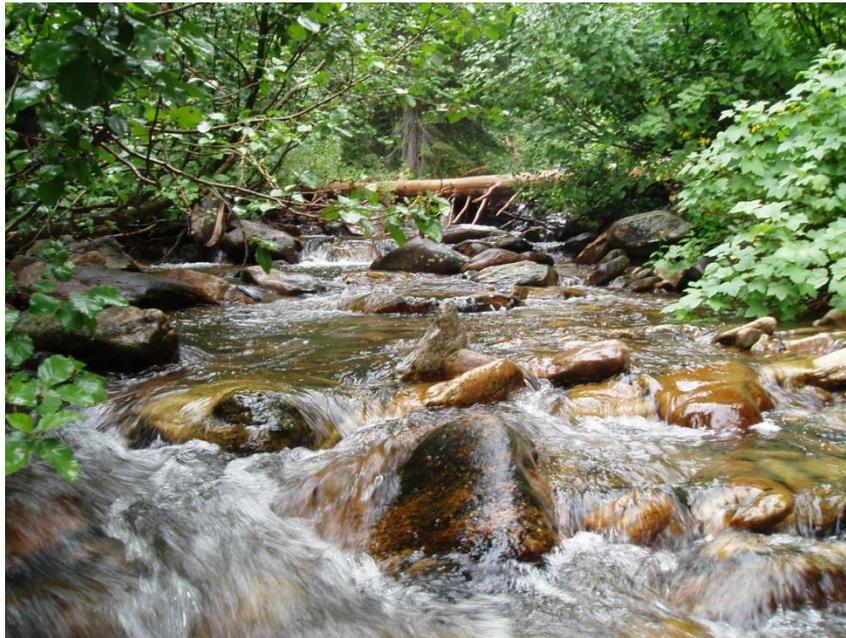


Figure 5. Upstream view of Little Weiser River start location of snorkel survey, August 11, 2010.



Figure 6. Upstream view of Little Weiser River end location of snorkel survey, August 11, 2010.

Anderson Creek was snorkeled on August 11, 2010. A total reach length of 100m was snorkeled. The water temperature was 7°C at 11:40. The average stream width was 4.1m and a maximum pool depth was 1.5m. A total of 25 Bull trout were observed. The length class was evenly split between 100mm-199mm and 200mm-299mm. One large Bull trout (>400mm) was observed in this reach. No photographs were obtained.

Sheep Creek was snorkeled on August 11, 2010. A total reach length of 100m was snorkeled. The water temperature was 10°C at 14:10. The average stream width was 2.2m and maximum pool depth was 1m. A total of 7 Bull trout and 26 Redband trout were observed. The majority length class was 100mm-199mm for both species. No photographs were obtained.

Bear Creek was snorkeled on August 10, 2010. A total reach length of 90m was snorkeled due to lightning in the area. Water temperature was 8°C at 15:18. The average stream width was 2.7m and maximum pool depth was 0.5m. A total of 5 Bull trout and 1 hybrid were observed. The majority length class was 100mm-199mm. No photographs were obtained.

Brook Trout Monitoring

A total of 5 Brook trout were observed during the 2010 snorkel survey. Three Brook trout were observed in the Little Weiser River at sites 3 and 4, located above the confluence with Anderson Creek. No Brook trout were observed in the Little Weiser River below the confluence with Anderson Creek. These results are consistent with the 2009 results except in site 4 where Brook-Bull trout hybrids were observed in 2009. Two Brook trout were observed in Anderson Creek at sites 7 and 8, both of which are located below the confluence of Anderson Creek and Sheep Creek. In 2009, no Brook trout were

observed in these sites. Three Bull trout were observed in Anderson Creek at site 9, located above the confluence with Sheep Creek. The most common fish observed in all reaches was Redband trout. Sheep Creek contained the lowest number of fish of all surveyed creeks.

Water temperature recorded in the Little Weiser River ranged between 10.5°C and 15.5°C while snorkeling between 10:00 and 15:00. The wetted channel width was 12.4m at site 1 and 5.4m at site 4. Anderson Creek water temperature recorded ranged between 10°C and 12.5°C with channel widths from 5.6m to 6.7m. Sheep Creek water temperature was 10.5°C and channel width of 3.4m. No photographs of the reaches surveyed for Brook trout monitoring were obtained in 2010.

The long term data collected since 1999 shows a slow invasion of Brook trout in the Little Weiser River and Anderson Creek (Appendix D, Table 4). Brook trout have also been observed in Crooked River and the East Fork Weiser River MIS surveys. The invasion of Brook trout into Bull trout habitat is important to monitor due to the ability of the two species to hybridize, thus impacting pure populations of Bull trout, an ESA listed threatened species.

Stream Temperature Monitoring

Stream water temperature monitoring is important in assessing Bull trout habitat because cold water temperatures are vital to Bull trout survival. Bull trout require cold water temperature below 13°C to survive. Tidbit thermographs were placed throughout the Weiser basin and Brownlee Reservoir Basin during late June and early July, 2010. Retrieval of the thermographs will occur by October 15, 2010. Site descriptions and data from the tidbits will be electronically stored at the Supervisor's Office of the Payette National Forest, McCall, ID.

Weiser basin: Three thermographs were placed in Anderson Creek (Site # W013, W194, W268). Two thermographs were placed in the Little Weiser River (Site # W107, W222). Four thermographs were placed in Sheep Creek (Site # W167, W168, W169, W264). Four thermographs were placed in East Fork Weiser River (Site # W109, W110, W186, W272). Two thermographs were placed in Dewey Creek (Site # W098, W273).

Brownlee Reservoir basin: Two thermographs were placed in Bear Creek (Site # W269, W153). Four thermographs were placed in Indian Creek (Site # W266, W220, W018, W249). One thermograph was placed in Camp Creek (Site # W274). Two thermographs were placed in Crooked River (Site # W158, W195).

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APPENDIX A

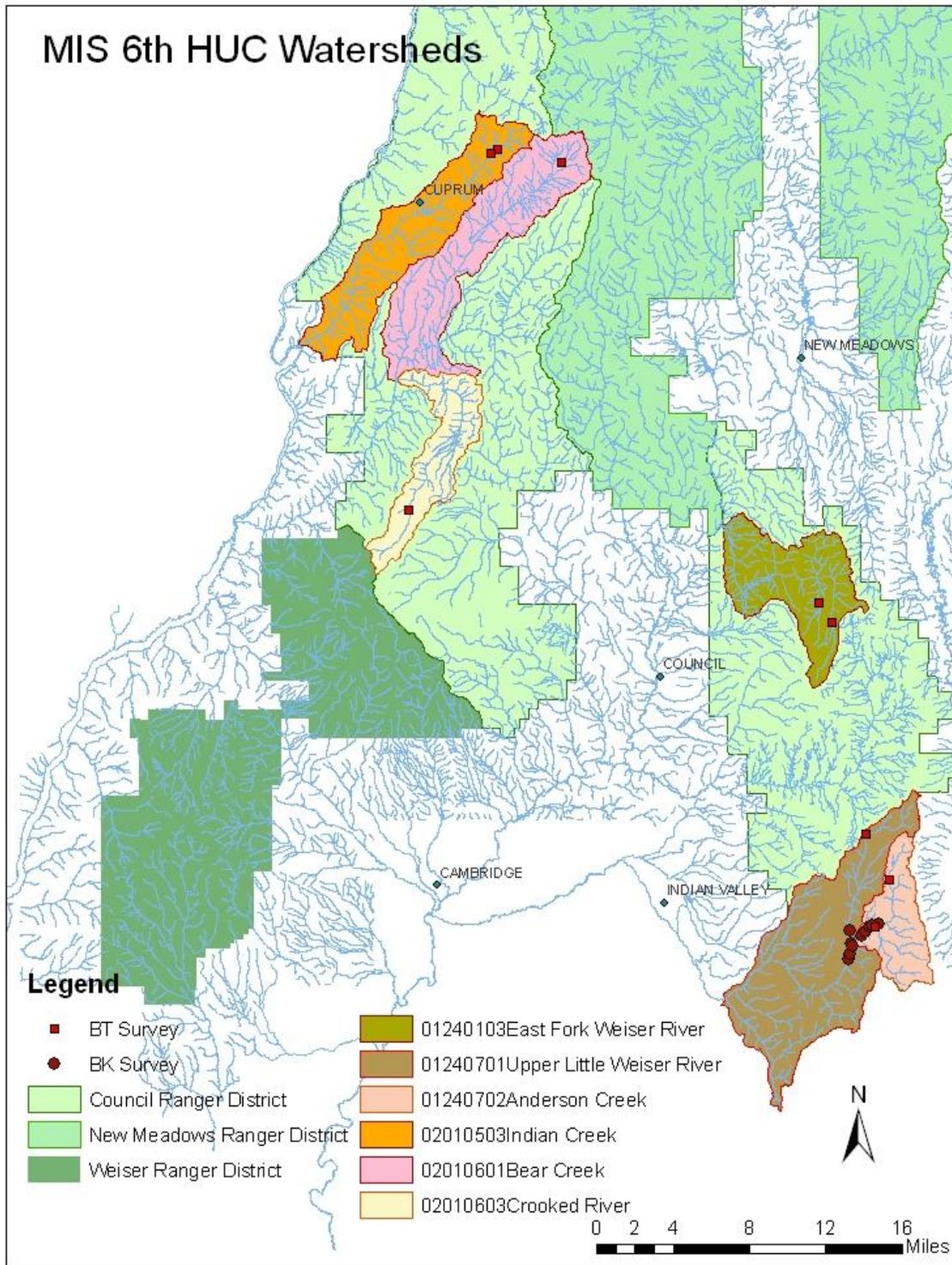


Figure 7. The 6th HUC watersheds surveyed for Bull Trout and Brook Trout within the West Zone of the Payette National Forest, including survey locations from 2010.

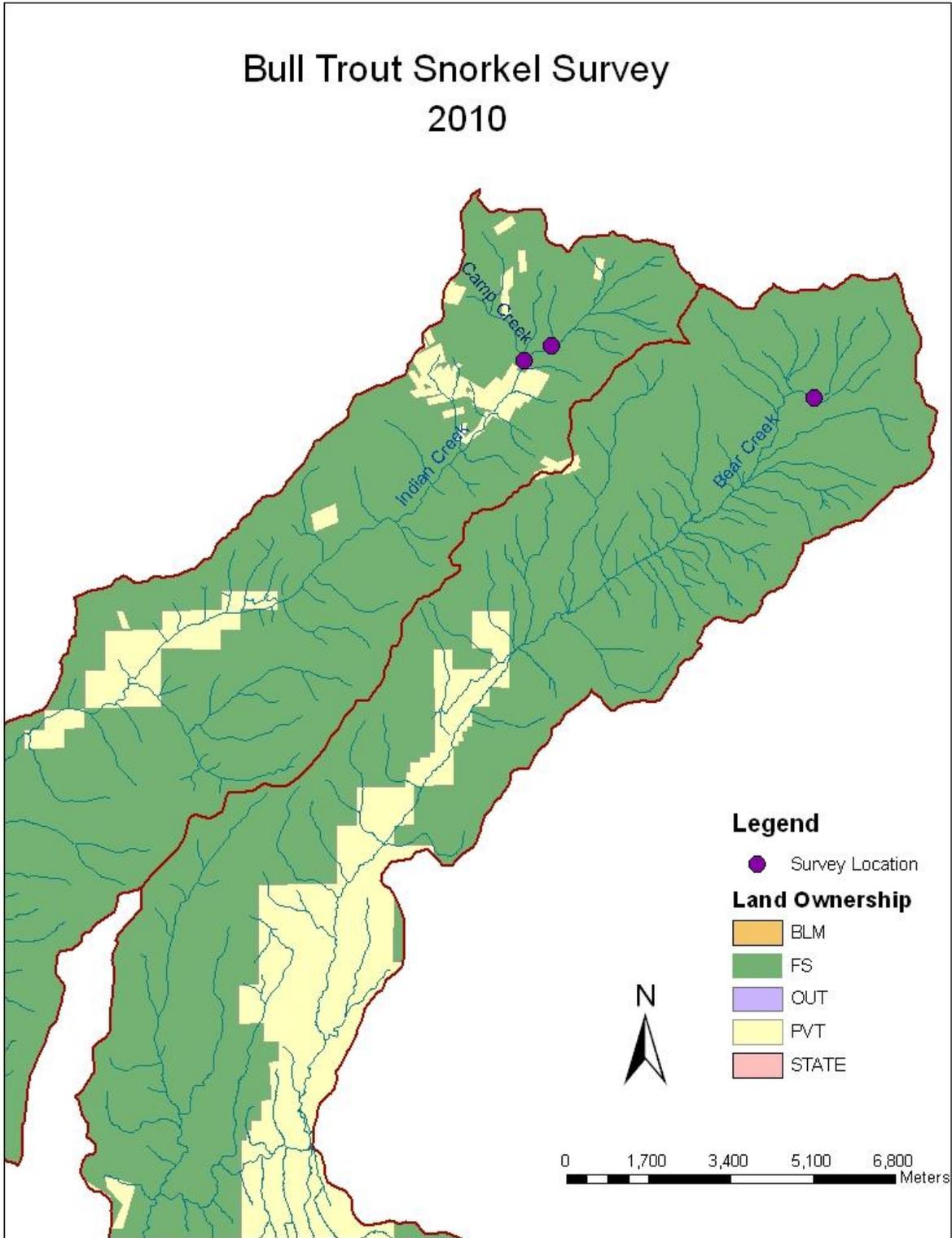


Figure 8. The Indian Creek and Bear Creek watersheds and MIS Bull trout survey locations.

Bull Trout Snorkel Survey 2010

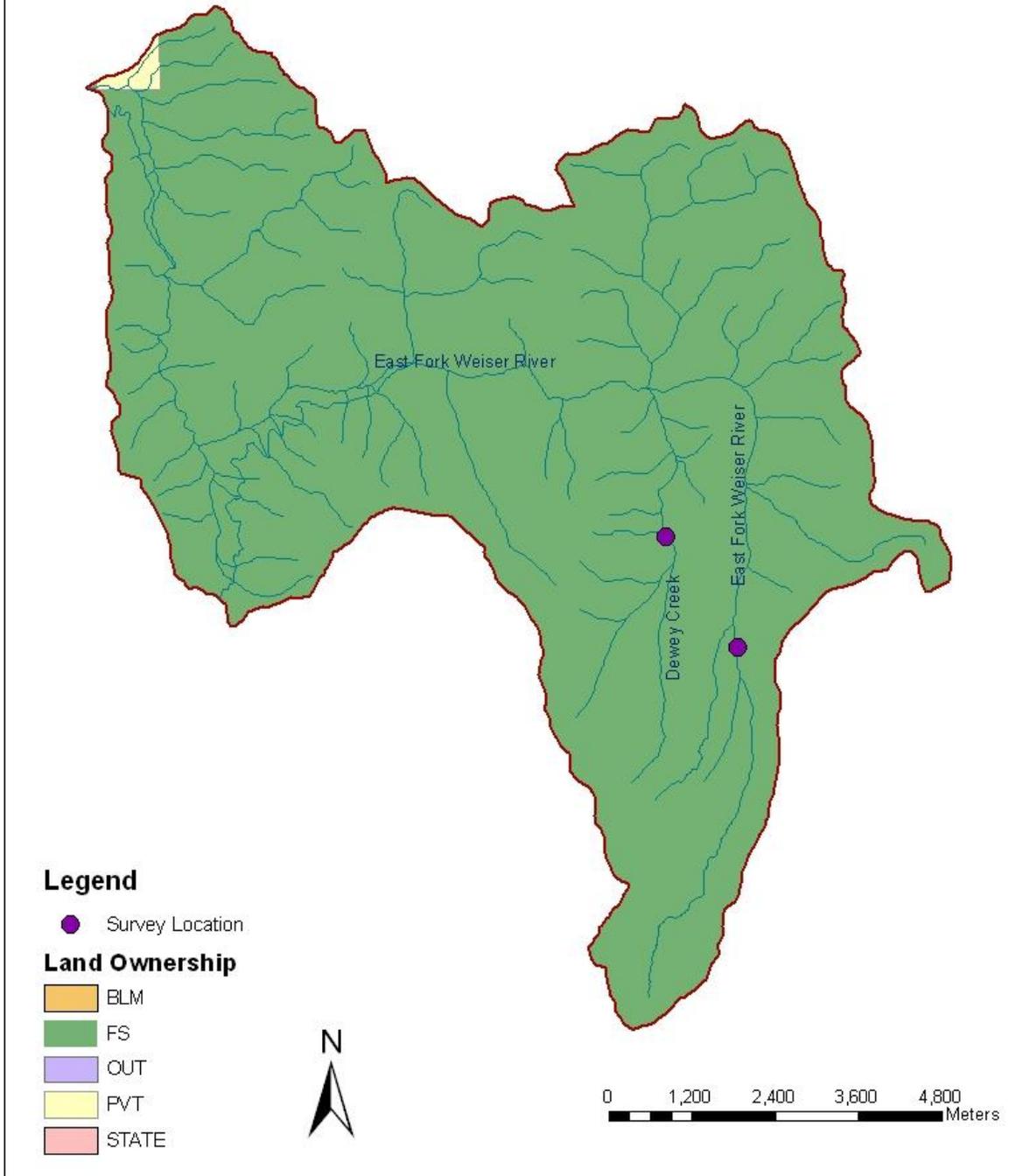


Figure 9. The East Fork Weiser River watershed and MIS Bull trout survey locations.

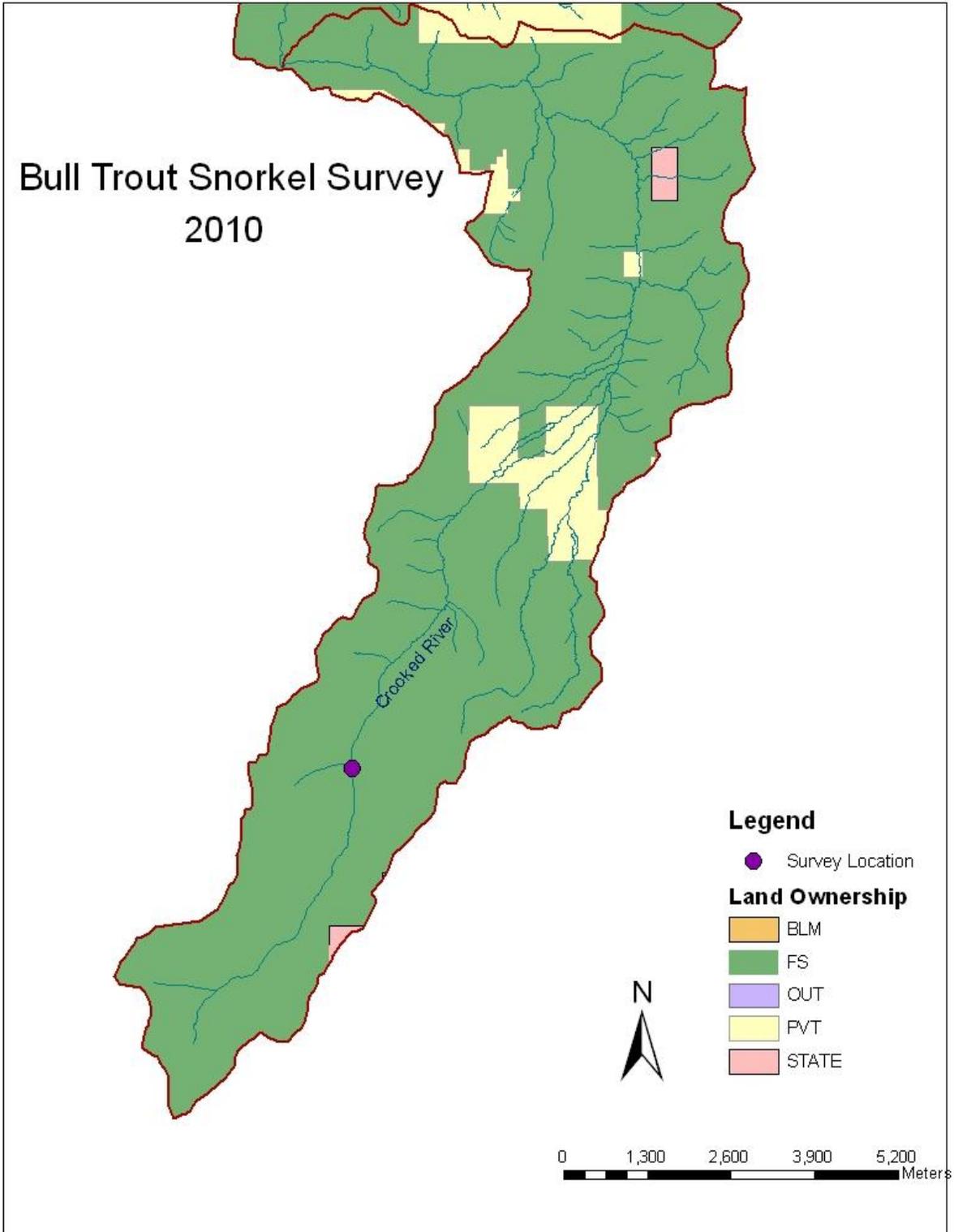


Figure 10. Crooked River watershed and MIS Bull trout survey location.

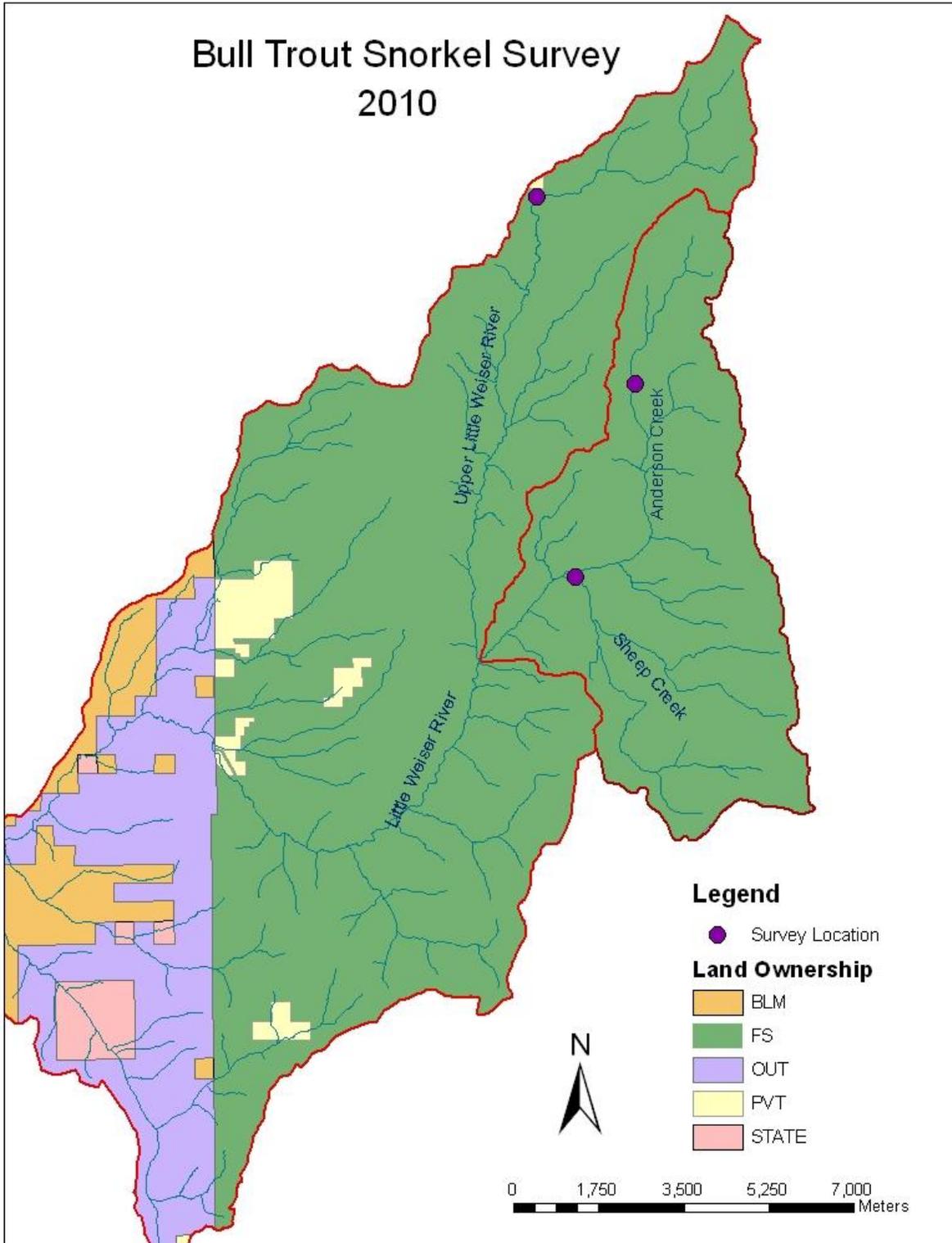


Figure 11. The Upper Little Weiser and Anderson Creek watersheds and MIS Bull trout survey locations.

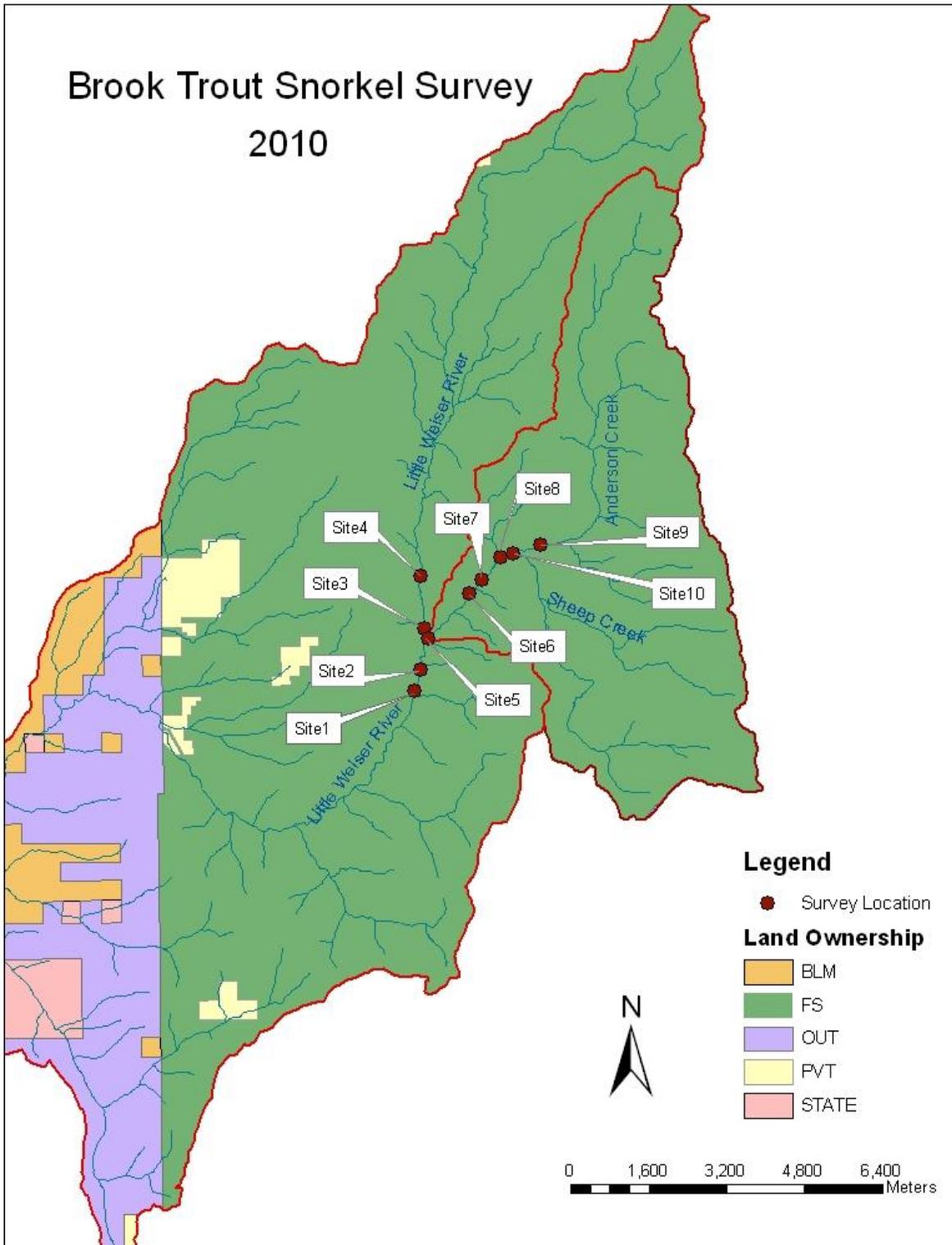


Figure 12. The Upper Little Weiser River and Anderson Creek watersheds and the Brook trout survey locations.

APPENDIX B

MIS Survey Protocol

West Zone, Payette National Forest

Council Ranger District

November 9, 2006

Nine MIS survey sites are present on the West Zone of the Payette National Forest, all on the Council Ranger District. Sites are located on Little Weiser River, Anderson Creek, Sheep Creek, East Fork Weiser River, Dewey Creek, Crooked River, Bear Creek, Indian Creek and Camp Creek (Indian Creek tributary). These sites were chosen in 2004 by fisheries biologists in areas where bull trout have been observed in past surveys. The following guidelines apply to all of the MIS sites:

- **MIS sites are 100m in length.**
- **Sites will be surveyed by one experienced diver.**
- **Sites should be surveyed in late July or early August, prior to August 15.**
- **A thermograph should be deployed at each of the MIS sites in the spring as other West Zone thermographs are deployed.**
- **If bull trout are not observed within the MIS site, alternate sites should be used to locate bull trout (as described below).**
- **Alternate sites will be 100m in length.**
- **If bull trout are not observed in the MIS site or alternates, the fishery biologist will determine additional locations and methods to detect bull trout.**

Study Sites

Little Weiser River

The MIS site is located approximately 120m downstream of the bridge at Beer Bottle Crossing (FS Road 326). Temperature monitoring site W10740 is located within the 100m site; an additional thermograph at this site is not required. If bull trout are observed at the MIS site, additional surveys are not required. If bull trout are NOT observed at this site, an alternate site 400m upstream should be surveyed. If bull trout are observed at the first alternate site, additional surveys are not required. If bull trout are NOT observed at the first alternate site, a second alternate site 400m upstream of the first should be surveyed. If bull trout are not observed at this site, the district fishery biologist will determine additional survey locations and methods.

Anderson Creek

The MIS site is located 100m downstream of the culvert on FS Road 835. If bull trout are observed at the MIS site, additional surveys are not required. If bull trout are NOT observed at this site, an alternate site 400m downstream should be surveyed. If bull trout are observed at the first alternate site, additional surveys are not required. If bull trout are NOT observed, a second alternate site 400m

downstream of the first alternate should be surveyed. If bull trout are not observed at the second alternate site, the district fishery biologist will determine additional survey locations and methods.

Sheep Creek

The MIS site is located approximately 20m upstream of the switchback on FS Road 180. This is one of the two sites used for brook trout monitoring. If bull trout are observed at the MIS site, additional surveys are not required. If bull trout are NOT observed at this site, an alternate site 400m upstream should be surveyed. If bull trout are observed at the first alternate site, additional surveys are not required. If bull trout are NOT observed at the first alternate site, a second alternate site 400m upstream of the first alternate should be surveyed. . If bull trout are not observed at the second alternate site, the district fishery biologist will determine additional survey locations and methods.

East Fork Weiser River

The East Fork Weiser River MIS site begins 100m downstream of the culvert on FS Road 906. If bull trout are observed at the MIS site, additional surveys are not required. If bull trout are NOT observed, an alternate site should be surveyed approximately 400m upstream. If bull trout are observed at the alternate site, additional surveys are not required. If bull trout are NOT observed at the first alternate site, a second alternate site 400m upstream of the first alternate should be surveyed. If bull trout are not observed at the second alternate site, the district fishery biologist will determine additional survey locations and methods.

Dewey Creek

The Dewey Creek MIS site begins 15m downstream of the confluence of Louie Creek. If bull trout are observed at the MIS site, additional surveys are not required. If bull trout are NOT observed, an alternate site 100m downstream of the second culvert on FS Road 487 should be surveyed. If bull trout are observed at the first alternate site, additional surveys are not required. If bull trout are NOT observed at the first alternate site, a second alternate site, 30m upstream of the second culvert on FS Road 487 should be surveyed. If bull trout are not observed at this site, the district fishery biologist will determine if additional surveys will be conducted. Two additional alternate sites have been surveyed on Dewey Creek in 2005 and 2006. Their locations are available on file at the Council Ranger District.

Crooked River

The MIS site on Crooked River is located approximately 400m upstream of the confluence of an unnamed right bank tributary (the first tributary that FS Trail 235 crosses). If bull trout are observed at the MIS site, additional surveys are not required. If bull trout are NOT observed, an alternate site 400m upstream should be surveyed. If bull trout are observed at the first alternate site, additional surveys are not required. If bull trout are NOT observed at the first alternate site, a second alternate site 400m upstream of the first should be surveyed. If bull trout are NOT observed at the second alternate site, the district fishery biologist will determine additional survey locations and methods.

Bear Creek

The Bear Creek MIS site begins approximately 400m downstream of the second bridge on FS Road 130. If bull trout are observed at the MIS site, additional surveys are not required. If bull trout are NOT observed, an alternate site 400m upstream (near the second bridge on FS Road 130) should be surveyed. If bull trout are observed at the alternate site, additional surveys are not required. If bull trout are NOT observed at the first alternate site, a second alternate site should be surveyed approximately 400m upstream of the first alternate site. If bull trout are NOT observed at the second alternate site, the district fishery biologist will determine additional survey locations and methods.

Indian Creek

The MIS site on Indian Creek is located approximately 800m upstream of the mouth of Camp Creek, approximately 20m upstream of an unnamed left bank tributary. If bull trout are observed at the MIS site, additional surveys are not required. If bull trout are NOT observed, an alternate site should be surveyed approximately 400m downstream. If bull trout are observed at the alternate site, additional surveys are not required. If bull trout are NOT observed at the first alternate site, a second alternate site should be surveyed approximately 400m downstream of the first alternate (begin at the mouth of Camp Creek). If bull trout are not observed at this site, the district fishery biologist will determine additional survey locations and methods.

Camp Creek

The MIS Site on Camp Creek begins approximately 10m US of the mouth of Camp Creek. A steep cascade/falls exists in the middle of the site. This is likely an upstream passage barrier in its current configuration. If bull trout are observed, additional surveys are not required. If bull trout are not observed at this site, the district fishery biologist will determine additional survey locations and methods.

APPENDIX C

Snorkel Data Form Payette National Forest-West Zone

Stream Name: _____ **UTM N:** _____
Legal Description _____ **UTM E:** _____

Site #: _____
Site Description: _____

Time: _____ **Date:** _____
Water Temperature: _____ **Air Temperature:** _____
Length _____ **Width:** _____
Max Depth: _____ **Visibility:** _____
Percent Pool: _____ **Percent Riffle:** _____
Diver 1: _____ **Diver 2:** _____ **Recorder:** _____

Length Class (mm)	Bull Trout	Brook Trout	Bull trout X Brook trout hybrids	Redband Trout	Unidentified Salmonids
<100 (4")					
100-199 (4-8")					
200-299 (8-12")					
300-399 (12-16")					
>400 (>16")					
TOTALS					

Sculpin _____ Dace _____ Whitefish _____ Red Side Shiner _____
 Other _____ YOY _____ TFA _____ TFT _____

Photos: _____

Comments: _____

APPENDIX D

Table 3 (a). Historical MIS Snorkel survey results from 2004 to 2010.

Stream Name	Date	Bull Trout	Brook Trout	Redband Trout	Hybrids	Other (#)
Indian Creek	07/27/04	4	0	0	0	0
	08/04/05	1	0	0	0	0
	07/27/06	3	0	0	1	0
	07/31/07	5	0	0	0	0
	08/06/08	31	0	0	0	0
	08/11/09	13	0	0	0	0
	08/10/10	28	0	0	1	0
Camp Creek	07/27/04	2	0	0	0	0
	08/04/05	3	0	0	0	0
	07/27/06	0	0	0	0	0
	07/31/07	0	0	0	0	0
	08/06/08	9	0	1	1	0
	08/11/09	14	0	2	0	0
	08/10/10	23	0	0	1	0
East Fork Weiser River	08/11/04	0	13	2	0	0
	08/02/05	2	8	2	4	0
	07/26/06	0	15	5	1	0
	08/01/07	1	4	1	0	0
	08/05/08	0	6	0	0	D(1)
	08/12/09	1	2	0	0	0
	08/09/10	2	9	0	1	A(1), B(1)
Dewey Creek	08/11/04	8	0	0	0	A(1)
	08/03/05	0	0	0	0	0
	08/08/05	0	0	0	0	0
	07/26/06	0	0	0	0	0
	08/14/06	0	0	0	0	0
	08/01/07	0	0	0	0	0
	08/05/08	4	0	0	1	0
	08/12/09	17	1	0	0	D(2)
	08/05/10	31	0	0	0	0
Crooked River	08/10/04	1	4	0	8	D(2)
	08/08/05	0	4	0	7	E(1)
	08/02/06	0	15	0	3	0
	08/06/07	1	24	0	1	0
	08/12/08	1	7	0	3	D(1)
	08/13/09	2	28	0	3	D(2)
	08/10/10	6	13	0	2	A(1), B(3)

Table 3 (b). Historical MIS snorkel survey results from 2004 to 2010, continued.

Stream Name	Date	Bull Trout	Brook Trout	Redband Trout	Hybrids	Other (#)
Little Weiser River	07/29/04	6	2	12	0	D(1)
	08/02/05	7	2	10	1	D(1)
	07/26/06	6	0	12	1	A(2)
	08/01/07	18	0	17	7	0
	08/04/08	10	0	7	1	0
	08/10/09	11	2	19	1	0
	08/11/10	15	1	18	3	0
Anderson Creek	07/29/04	17	0	0	0	A(1), F(1)
	08/02/05	28	0	0	0	0
	07/26/06	24	0	0	0	0
	08/01/07	19	0	0	0	0
	07/30/08	29	0	0	0	0
	08/12/09	33	0	0	0	0
	08/11/10	25	0	0	0	0
Sheep Creek	07/26/04	1	0	19	1	D(1)
	08/01/05	8	0	45	0	0
	07/25/06	6	0	64	0	0
	08/01/07	26	1	57	0	D(1), E(2)
	07/30/08	2	0	24	0	0
	08/10/09	12	0	25	0	A(1)
	08/11/10	7	0	26	0	B(2)
Bear Creek	08/04/04	3	0	0	0	0
	08/03/05	19	0	0	0	A(1)
	08/01/06	15	0	0	0	D(1)
	07/30/07	24	0	0	0	0
	08/07/08	11	0	0	0	0
	08/11/09	5	0	0	0	0
	08/11/10	5	0	0	1	0

Table 4 (a). Historical results of Brook trout monitoring from 1999 to 2010. Density is presented as # fish per 100m surveyed. The density measure from 2010 was determined by $((\# \text{ fish})/(\text{Average width} \times 100\text{m})) \times 100$. The exact formula used for past measurement is unknown.

Site	Stream Name	UTM Location	Average Width	Date Surveyed	Brook Trout	Redband Trout	Bull Trout	Hybrid
1	Little Weiser River	11T 0559763 4924192	13.6	Sep-99	NS	NS	NS	NS
				Sep-00	0	2.059	0	0
				Sep-01	0	4.93	0	0
				Aug-02	0	1.84	0	0
				Sep-02	NS	NS	NS	NS
				Aug-03	0	5.81	0	0
				Sep-03	0	0.44	0	0
				Jul-04	0	1.47	0	0
				Jul-05	0.07	2.94	0	0
				Jul-06	0.07	1.62	0	0
				Aug-07	0	1.1	0	0
				Jul-08	0.07	1.69	0	0
				Aug-09	0	0.81	0	0
Aug-10	0	4.63	0	0				
2	Little Weiser River	11T 0560006 4930061	13.9	Sep-99	NS	NS	NS	NS
				Sep-00	0	3.02	0	0
				Sep-01	NS	NS	NS	NS
				Aug-02	0	2.45	0	0
				Sep-02	NS	NS	NS	NS
				Aug-03	0	5.54	0	0
				Sep-03	0	1.22	0	0
				Jul-04	0	6.4	0	0
				Jul-05	0	7.99	0	0
				Jul-06	0	5.83	0	0
				Aug-07	0	1.87	0	0
				Jul-08	0	3.17	0	0
				Aug-09	0	2.6	0	0
Aug-10	0	3.74	0	0				
3	Little Weiser River	11T 0560115 4930751	5.9	Sep-99	NS	NS	NS	NS
				Sep-00	0	14.58	0	0
				Sep-01	0	14.24	0	0
				Aug-02	0	17.97	0	0
				Sep-02	0	13.05	0	0
				Aug-03	0	12.03	0	0
				Sep-03	0	13.05	0	0
				Jul-04	0	5.42	0	0
				Jul-05	0	7.45	0	0
				Jul-06	0	4.58	0	0
				Aug-07	0	0.68	0	0
				Jul-08	0.34	9.15	0	0
				Aug-09	0.17	0.68	0	0
Aug-10	0.169	9.15	0	0				
4	Little Weiser River	11T 0559965 4931916	5.9	Sep-99	NS	NS	NS	NS
				Sep-00	0	12.89	0	0
				Sep-01	0	10	0	0
				Aug-02	0	8.48	0	0
				Sep-02	NS	NS	NS	NS
				Aug-03	0.17	15.93	0	0
				Sep-03	0	2.37	0	0
				Jul-04	0	14.24	0	0
				Jul-05	0	10.85	0	0
				Jul-06	0	9.49	0	0
				Aug-07	0	2.2	0	0
				Jul-08	0	12.54	0	0
				Aug-09	0	11.85	0	0.17

Table 4 (b) Historical results of Brook trout monitoring from 1999 to 2010, continued.

Site	Stream Name	UTM Location	Average Width	Date Surveyed	Brook Trout	Redband Trout	Bull Trout	Hybrid
5	Anderson Creek	11T 0560110 4930677	7.4	Sep-99	0	2.97	0	0
				Sep-00	0	5.95	0	0
				Sep-01	0	8.51	0	0
				Aug-02	0	4.46	0	0
				Sep-02	0	2.7	0	0
				Aug-03	0	6.8	0	0
				Sep-03	0	7.97	0	0
				Jul-04	0	8.78	0	0
				Jul-05	0	10.54	0	0
				Jul-06	0	7.43	0	0
				Aug-07	0	0.95	0	0
				Jul-08	0	8.65	0	0
				Aug-09	0	4.05	0	0
				Aug-10	0	6.62	0	0
6	Anderson Creek	11T 0560992 4931587	7.4	Sep-99	0	1.49	0	0
				Sep-00	NS	NS	NS	NS
				Sep-01	0	1.49	0	0
				Aug-02	0	11.89	0	0
				Sep-02	0	1.22	0	0
				Aug-03	0.14	11.62	0	0
				Sep-03	0	3.38	0	0
				Jul-04	0	14.05	0	0
				Jul-05	0	11.08	0	0
				Jul-06	0	10.54	0	0
				Aug-07	0	7.3	0	0
				Jul-08	0	15.14	0	0
				Aug-09	0	18.24	0.14	0
				Aug-10	0	7.43	0	0
7	Anderson Creek	11T 0561435 4931840	7.4	Sep-99	0	1.08	0	0
				Sep-00	0	1.76	0	0
				Sep-01	NS	NS	NS	NS
				Aug-02	0	2.97	0	0
				Sep-02	NS	NS	NS	NS
				Aug-03	0	10.68	0	0
				Sep-03	0	1.081	0	0
				Jul-04	0	11.486	0	0
				Jul-05	0	9.32	0	0
				Jul-06	0	8.11	0	0
				Aug-07	0	12.16	0.027	0
				Jul-08	0	7.03	0.014	0
				Aug-09	0	10.95	0	0
				Aug-10	0.135	7.03	0	0
8	Anderson Creek	11T 0561693 4932348	7.4	Sep-99	0	1.061	0	0
				Sep-00	0	1.757	0	0
				Sep-01	NS	NS	NS	NS
				Aug-02	0	2.973	0	0
				Sep-02	NS	NS	NS	NS
				Aug-03	0	10.676	0	0
				Sep-03	0	1.081	0	0
				Jul-04	0	11.486	0	0.1923
				Jul-05	0	10.27	0	0
				Jul-06	0	8.378	0	0
				Aug-07	0	5.27	0.135	0
				Jul-08	0	5.676	0	0

Aug-09	0	8.649	0.135	0
Aug-10	0.135	4.05	0	0

Table 4 (c). Historical results of Brook trout monitoring from 1999 to 2010, continued.

Site	Stream Name	UTM Location	Average Width	Date Surveyed	Brook Trout	Redband Trout	Bull Trout	Hybrid
9	Anderson Creek	11T 0562413 4932663	5.2	Sep-99	0	0.385	0	0
				Sep-00	0	4.038	0	0
				Sep-01	NS	NS	NS	NS
				Aug-02	0	10.577	0	0
				Sep-02	NS	NS	NS	NS
				Aug-03	0	19.038	0	0
				Sep-03	0	3.077	0	0
				Jul-04	0	10.962	0	0
				Jul-05	0	14.038	0.0962	0
				Jul-06	0	13.654	0.192	0
				Aug-07	0	10.769	0.385	0
				Jul-08	0	14.42	0.192	0
				Aug-09	0	31.346	4.038	0
				Aug-10	0	3.65	0.58	0
10	Sheep Creek	11T 0561850 4932428	4.6	Sep-99	0	0.435	0.435	0
				Sep-00	0	1.087	0	0
				Sep-01	0	1.739	0.87	0
				Aug-02	0	2.391	0	0
				Sep-02	0	0	0	0
				Aug-03	0	5	0.435	0
				Sep-03	0	0.435	0	0
				Jul-04	0	6.957	0	0
				Jul-05	0	11.739	0.217	0
				Jul-06	0	6.739	0.0652	0
				Aug-07	0	4.348	0.217	0
				Jul-08	0	5.217	1.739	0
				Aug-09	0	8.913	2.391	0
				Aug-10	0	1.52	0	0
11	Sheep Creek	11T 0562153 4932370	4.6	Sep-99	0	1.739	0.435	0
				Sep-00	0	1.522	0	0
				Sep-01	0	4.13	0.87	0
				Aug-02	0	4.13	0.217	0
				Sep-02	0	0.217	0	0
				Aug-03	0	6.957	1.087	0
				Sep-03	0	0.652	0	0
				Jul-04	0	4.13	0.217	0.217
				Jul-05	0	9.783	1.739	0
				Jul-06	0	13.913	1.304	0
				Aug-07	0.217	12.391	5.652	0
				Jul-08	0	5.217	0.435	0
				Aug-09	0	5.435	2.609	0
				Aug-10	NS	NS	NS	NS