Movement of Yellowstone Cutthroat Trout in the Wind River Watershed of Wyoming

Final Report

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Abstract

Movement patterns of Yellowstone cutthroat trout in the East Fork Wind River drainage were evaluated by capturing and radio-tagging 57 fish throughout the drainage during the fall of 2008 and spring of 2009 and tracking their movements until the fish or the tag batteries died. Cutthroat trout that were tracked through the winter had a small home range, generally remaining within 2 km of their tagging and release site. Cutthroat trout radio-tagged during the spring moved up to 40 km either up or downstream prior to the expected spawning period. One fish moved as far downstream as the Wind River where it was located during the spawning season. Other radio-tagged cutthroat spawned within the East Fork Wind River and some moved into the lower end of Bear Creek during the spawning season. Above normal precipitation during June likely kept stream flows relatively high and temperatures relatively low throughout the lower East Fork Wind River during the summer of 2009. Therefore, we were unable to assess whether cutthroat trout exit those areas due to either low flows or high water temperatures. Winter habitat in the form of deep pools and woody debris jams were scarce on the East Fork Wind River and capturing fish in that area immediately following winter was difficult. However, during the last tracking period which took place in late September, cutthroat trout that were radio-tagged in the East Fork Wind River primarily returned to that area, although one remained downstream in the Wind River. One radio-tagged cutthroat trout was observed to become entrained into an irrigation ditch during the study.

Introduction

The East Fork Wind River is a 427 mi^2 basin located in the northeast corner of the upper Wind River drainage in northwest Wyoming (Figure 1). Streams in the basin drain the southwest portion of the Absaroka Range and the headwaters of the East Fork are in the Washakie Wilderness, which is part of the Shoshone National Forest. In addition to Forest Service land, the basin contains private, state, Wyoming Game and Fish Commission (WGFC), and BLM holdings.

Yellowstone cutthroat trout are the only native trout in the East Fork Wind River drainage but are suspected to have been "hybridized out of existence" (Binns 1996) by stocked Snake River cutthroat trout. Non-native brook trout, brown trout, and native whitefish also occur at the lower elevations. Rainbow trout are present throughout the mainstem Wind River near the project area, but are rare in the East Fork Wind River. Important native non-game fish in the East Fork Wind River system include mountain sucker and longnose dace.

Cutthroat trout are found throughout the East Fork Wind River drainage during the summer and fall and water temperatures are generally favorable for them during this time. However, in the lower East Fork Wind River warm summer water temperatures may be a problem. Additionally, low summer flows may reduce habitat availability in some areas so that trout are forced to migrate to more suitable habitat.

In addition to potential flow and water temperature problems, occasional heavy summer rain storms mobilize the easily eroded sediment in the drainage and transport it into the lower East Fork. During these times, a large amount of sediment can be transported resulting in high turbidity (turbidity readings exceeding 1000 NTU's have been recorded in Bear Creek and the East Fork; see Binns 1996). Fish habitat and fish distribution may be strongly affected by these events. Spawning habitat may also be negatively affected by these events, and may result in spawning only in upstream tributary areas.

Winter conditions throughout the drainage can be severe and ice formation may eliminate the limited habitat in the middle and lower East Fork Wind River (Binns 1996). The response of trout to these conditions is unknown. This is particularly true for the lower mainstem of the East Fork Wind River, where few deep pools exist and inadequate winter habitat may limit trout production (Binns 1996). Larger fish may be forced downstream into the Wind River to spend the winter.

Irrigation takes place throughout the drainage but no formal barrier assessment has been conducted to determine whether or not fish can successfully move between seasonally available habitats. Additionally, the extent to which downstream migrating fish are entrained in many irrigation canals is unknown. However, entrainment has been evaluated at four locations that divert water from Bear Creek to irrigated areas within the Inberg/Roy Wildlife Habitat Management Area and Spence/Moriarity Wildlife Management Area (WGFD 2008; WGFD in press).

Despite the high potential for movement of cutthroat trout within the East Fork Wind River watershed, no studies have been conducted to determine the extent and

timing of fish movements in that area. Therefore, this telemetry study was conducted to address the following objectives.

Identify whether or not cutthroat trout present in the East Fork Wind River and its tributaries winter in those areas or migrate to larger streams downstream.

Identify where fish that are present in the East Fork during the spring spend the winter, and where and when they spawn.

Assess the proportion of fish entrained by irrigation diversions as they move downstream from spawning areas.

Identify whether low flow conditions and high summer water temperatures may cause fish to abandon lower East Fork reaches and move either upstream to tributaries or downstream to the Wind River.

Understanding trout movement in the East Fork Wind River will lead to a better understanding of the habitat requirements for native trout in this area. This will ultimately help managers determine where habitat improvement efforts can most effectively be utilized.

Methods

Movement of cutthroat trout in the East Fork Wind River was evaluated by implanting radio transmitters in 41 adult cutthroat trout during the fall of 2008 (Table 1), and in 16 adult cutthroat trout during the spring 2009 (Table 2) and tracking their movements through the following several months. During the fall of 2008, cutthroat trout were collected from Bear Creek, Wiggins Fork, and the middle and upper East Fork Wind River (Figure 1) via backpack electrofishing and were radio tagged and released near their capture location. During the spring, cutthroat trout were collected from the upper and lower East Fork Wind River (Figure 1) via electrofishing and were again radio tagged and released near their capture location.

Radio transmitters were surgically implanted using a shielded-needle technique similar to Winter (1996) and Swanberg et al. (1999). Transmitters were designed for internal body implant (Advanced Telemetry Systems model F1560, 1.5 volt, 13 mm wide x 24 mm long x 5 mm thick, 2.5 g, 152 - 153 MHz) and had a 30.5 cm trailing whip antenna. Radio transmitters and surgical instruments were sanitized prior to each surgery with a betadine solution. All radio tagged trout were between 26 and 45 cm long and weighed between 174 and 1110 g. Therefore, transmitter weight was always less than 2% of the fish's body weight as suggested by Winter (1996). Surgeries were conducted by placing the fish upside down on a wooden trough-shaped operating table and an electric pump was used to irrigate their gills throughout the surgery. An incision (~15 mm long) was made anterior to the pelvic girdle and slightly removed from the fish's mid-ventral line. A small spoon was inserted into the incision and an 18-gauge needle was then pushed through the body wall slightly posterior and laterally from the incision until it bumped against the spoon shield. The transmitter antenna was inserted into the incision and then pushed through the needle; the needle was then removed leaving the antenna extending through the hole made by the needle. The transmitter was then placed inside the body cavity and moved posterior by pulling gently on the antenna. The incision was closed with stainless steel staples (Swanberg et al. 1999). Fish were held in screen

cages in the stream, were observed until they had recovered from the immediate effects of surgery, and were then released.

Radio tagged fish were relocated about once every month from the time of tagging through September 2009. Fish were tracked with an Advanced Telemetry Systems R2100 receiver from an automobile, airplane, or while walking along the river. When a signal was encountered it was followed to its source or as close to its source as could be accomplished and the GPS position was recorded. The fish was then assumed to be at the closest portion of the river. When fish were located near tributary streams, care was taken to determine whether they were in the tributary or the main stream.

To assess movement, river kilometer was delineated for the Wind River, East Fork Wind River, and its tributaries. Delineations were done by plotting the 1:100,000 scale National Hydrography Datatset on a Geographic Information System computer and then plotting points at 200 m intervals along those lines beginning at the mouth of each stream. Points were then numbered beginning with 0 at the mouth of each stream and proceeding upstream and adding 0.2 km at each point. Each time a fish was located, its positions was noted as relative to river km designations.

During October 2008, temperature loggers were deployed at various locations throughout the East Fork Wind River drainage, including at the tagging sites on Bear Creek, Wiggins Fork, and at the tagging site on the upper East Fork Wind River near the mouth of Alkali Creek. Two other temperature loggers were deployed downstream in the East Fork Wind River, but were lost over the course of the study.

Besides the research component of this study, this project was intended to provide a learning experience for local school children. The study was conducted as an "Adopt-A-Trout" program which is an outdoor recreation and conservation education program that gives 3rd - 6th grade students opportunities to explore local river systems, participate in a science based research project, learn about fish, and develop fishing skills. The objective of the program is to "Bring Kids to Wyoming's Rivers and Trout to Wyoming's Kids." As a result of this program, Dubois students participated in the capture, radio-tag implantation, and tracking of the fish in this study.

Results

During the winter (September – March) cutthroat trout that had been radio-tagged in Bear Creek, Wiggins Fork, and the middle and upper East Fork Wind River occupied a small home range (mean < 0.9 km), and most fish were found near woody debris, large boulders, or bedrock outcrops. All cutthroat trout radio-tagged in the Wiggins Fork and all but one cutthroat trout radio-tagged in Bear Creek remained within 1 km of their tagging location throughout the winter. The single fish that moved more than 1 km in Bear Creek moved 3.6 km downstream between the end of September and the end of October and remained in that area through the remainder of the winter. All cutthroat trout except one that were radio-tagged in the Upper East Fork remained within 0.5 km of their capture location. The exception to this was a single fish that moved 1.4 km upstream between tagging and mid December. Cutthroat trout radio-tagged in the middle East Fork Wind River moved 3.1 – 4.2 km downstream between tagging and mid November (2 fish), went less than 2 km upstream also between tagging and mid

November (3 fish), or stayed within 1 km of the release location (3 fish). Additionally, one radio-tagged trout moved upstream from the East Fork Wind River into Bear Creek, and remained there through the winter.

The home range size for radio-tagged cutthroat trout in the upper East Fork Wind River during summer (April – September) was much larger (mean = 23.0 km) than was observed for radio-tagged fish in the same reach during the winter (Figure 2). All four cutthroat trout that were radio-tagged in that section during the spring, and were located multiple times, made substantial movements and all moved downstream between tagging and the end of June. Home range size for these fish over the course of the summer ranged from 14.6 – 40.0 km. The fish that moved the farthest moved downstream into the Wind River, then moved down the Wind River a short distance (3.7 km) and then moved back up the Wind River to a location near the mouth of Jakeys Fork.

Cutthroat trout radio-tagged in the lower East Fork also had a large home range (mean 14.5 km). Five of these fish were tracked into September and made substantial (17.3 – 23.3 km) upstream movements, and those five had made those movements before the end of June. Three of those fish moved into the lower end of Bear Creek before the end of June. Two additional cutthroat trout radio-tagged in the lower East Fork during the spring remained near their capture location during the period over which they were tracked. One of these fish was harvested by an angler in early August within 2.5 km of its capture location and the other remained within 0.5 km of its capture location into September.

Average daily water temperatures in Wiggins Fork and the upper East Fork remained near 0 °C from the end of November through the end of March and did not exceed 10 °C until almost mid-July (Figure 3). During the summer, maximum average daily water temperature did not exceed 15 °C and average daily water temperature during the summer was slightly higher in Bear Creek than in Wiggins Fork or the upper East Fork Wind River (Figure 3).

One fish was verified to become entrained into an irrigation ditch as it was located in a gated irrigation pipe in an irrigated pasture during late July. We were unable to determine if it was alive when it was entrained from Bear Creek into the head of the ditch.

Discussion

Trout that were radio-tagged at the beginning of winter in Bear Creek, Wiggins Fork, and the upper and middle East Fork Wind River were either resident fish or were already at their winter locations, as little movement was observed between tagging and April. Most of these fish could easily have been resident fish as they were primarily between 26 and 38 cm in length. However, one trout that was radio-tagged in Bear Creek was 44 cm long and moved the second longest distance of any fish radio tracked during the winter. However, that fish only moved 3.2 km downstream. Two trout in the upper East Fork were over 42 cm but these made relatively small movements. These fish may be a little large to be headwaters resident fish. Nevertheless, these fish remained in headwaters locations throughout the winter.

Concealment structure and/or deep pools are important over-winter habitat components for trout (Bjornn and Reiser 1991, Cunjak 1996, Meyer and Gregory 2000). Our winter observation of radio-tagged trout in association with woody debris, large boulders, or bedrock outcrops suggests this is also true for adult cutthroat trout in the East Fork Wind River. Additionally, we observed few adult cutthroat trout in the lower and portions of the upper East Fork Wind River, in April and found that adult cutthroat trout present in April were associated with large woody debris jams. Thus the scarcity of large woody debris jams in portions of the East Fork Wind River suggests, as did Binns (1996), that winter habitat may limit trout production in the East Fork Wind River.

The minimal movements we observed during winter were similar to those observed for cutthroat trout in other areas during the winter (Jakober et al. 1998, Young 1998, Gregory and Yates 2009). The exception to this behavior seems to occur when dynamic icing conditions (i.e. frazil ice and anchor ice formation) occur (Lindstrom and Hubert 2004). Brown and Mackay (1995) found that anchor ice formation could cause cutthroat trout to move to overwintering areas less likely to be influenced by frazil and anchor ice. In our study, surface ice formed early in the winter in areas where cutthroat trout spent the winter. Therefore, icing conditions were static and minimal movement was observed.

Determining locations where fish spent the winter based on fish radio-tagged in April 2009 and tracked through September 2009 was difficult. Fish captured in April may have still been in their wintering locations, as radio-tagged cutthroat trout that were last tracked less than three weeks earlier in upstream portions of the basin were still in their winter locations at that time. However, spring water temperatures were likely colder in those areas than in the lower East Fork Wind River which may have caused fish to remain in wintering areas longer in upstream locations than further downstream.

Cutthroat trout densities in the lower East Fork Wind River during April 2009 were very low, as evidenced by the length of stream we had to electrofish during that time to capture trout for radio-tag implantation. This observation suggests, as Binns (1996) indicated, that winter habitat may limit trout production in the lower East Fork Wind River.

Also, it was not possible to determine where these fish spent the following winter, as transmitter batteries were expected to die and therefore no tracking was conducted after 21 September, 2009. However, fish radio-tagged in Bear Creek, Wiggins Fork, and middle and upper East Fork Wind River near the end of September of 2008 were in their wintering locations by that time. Again, temperature differences may have caused upstream fish to adopt winter behavior sooner than fish in downstream areas. During the last tracking period (21 September), fish that were tagged in the upper east Fork were present in the lower East Fork Wind (2 fish) or in the Wind River near the mouth of Jakeys Fork (1 Fish). During this same time, fish that were tagged in the lower East Fork Wind River were in the lower East Fork Wind River (4 fish) and middle East Fork Wind River(1 fish). Although the sample size is very low, our data suggest that cutthroat trout present in the upper East Fork during the spring may move downstream to winter locations and cutthroat trout present in the lower East Fork during the spring may spend the following winter in or near the lower East Fork Wind River. Again, this is a tentative observation based on limited data.

In the South Fork of the Snake River in Idaho, Yellowstone cutthroat trout have been observed to be in spawning sites between 2 April – 10 June (Henderson et al. 2000). Since the East Fork Wind River is further north and higher in elevation, spawning timing and the time when fish are present in the spawning areas is likely later. We assumed that radio-tagged cutthroat trout were in their spawning area after some migration and before 1 July. Using these criteria, it appears that fish that were radio-tagged in the upper East Fork Wind River spawned at downstream locations, one even moving downstream into the Wind River before the end of May. Additionally, one radio-tagged trout moved upstream 5 km by 3 June and then 18.6 km downstream by 30 June. Therefore, it may have spawned in either location. Cutthroat trout radio-tagged in the lower Wind River spawned in Bear Creek (3 fish), in the upper East Fork Wind River (2 fish), or remained in the lower East Fork Wind River (2 fish). One fish that remained in the lower East Fork Wind River never moved more than 0.5 km from its release location and may have been dead or sloughed the tag (Chisholm and Hubert 1985, Baras and Westerloppe 1999). However, the other fish that remained in the lower East Fork Wind River did not move more than 2.5 km before the end of July, but was harvested by an angler in August.

We were unable to determine whether high summer temperatures and low late summer discharge in the lower East Fork Wind River influenced distribution of fish during late summer for several reasons. First, the temperature loggers deployed in the middle and lower East Fork Wind River reaches were lost. Therefore, we were unable to determine when or if high temperatures occurred. Second, continuous discharge measurements were not recorded in the East Fork Wind River. However, discharge records in the Wind River recorded just downstream from the mouth of the East Fork Wind River and above Red Creek (USGS gage #06220800) indicated that discharge remained higher than average in that drainage throughout much of the summer (Figure 4). This pattern was likely true for the East Fork Wind River drainage as historical gage records show that discharge in the Wind River at this gage is highly correlated (R^2 = 0.94) with discharge in the East Fork Wind River. Furthermore, precipitation during June 2009, was nearly 3 times the average June precipitation (Figure 5); measured at the Natural Resource Conservation Service SnoTel site on Burroughs Creek 6 km west of the East Fork Wind River and the Kirwin site in the Wood River drainage just 2 km north of the East Fork Wind River).

Fish entrained into irrigation canals or ditches are only lost to the population if they fail to exit those ditches. During this study, one fish was entrained and failed to exit, as it was found dead in a “gated pipe” irrigation system. This occurred during the post spawning period when cutthroat trout would be expected to move back downstream, and therefore when they are most vulnerable to entrainment. However, post-spawning mortality is high (Hartman et al. 1962) and dead fish have been seen to travel downstream > 1 km (Schill et al. 1986). Therefore, the entrained fish may have been dead when it was entrained, although live fish are also regularly entrained into irrigation ditches (Carlson and Rahel 2007) and recent studies have documented entrainment of cutthroat trout into Bear Creek Diversions (WGFD 2008, WGFD in press).

Conclusions and Recommendations

Cutthroat trout in the upper East Fork Wind River and its tributaries successfully over-winter in those locations, but some also may move downstream to the Wind River to spend the winter.

Few fish were present in the lower East Fork Wind River and downstream portions of the upper East Fork Wind River during April of 2009. Almost all fish captured during this time were associated with complex woody debris jams, which were scarce in those sections of river, suggesting that winter habitat may limit fish production in those areas.

Radio-tagged cutthroat trout located during the winter were often near woody debris, large boulders, or bedrock outcrops; which further emphasizes the importance of structure to adult cutthroat trout for winter habitat.

One radio-tagged fish was entrained into an irrigation ditch and failed to exit back to the river. Diversions should be evaluated to ensure that entrained fish are able to exit when entrainment occurs.

Cutthroat trout in the East Fork Wind River make extensive migrations; therefore, it is important to ensure that diversion dams and other potential migration blockages, such as road crossings, are constructed to facilitate trout movement.

Acknowledgements

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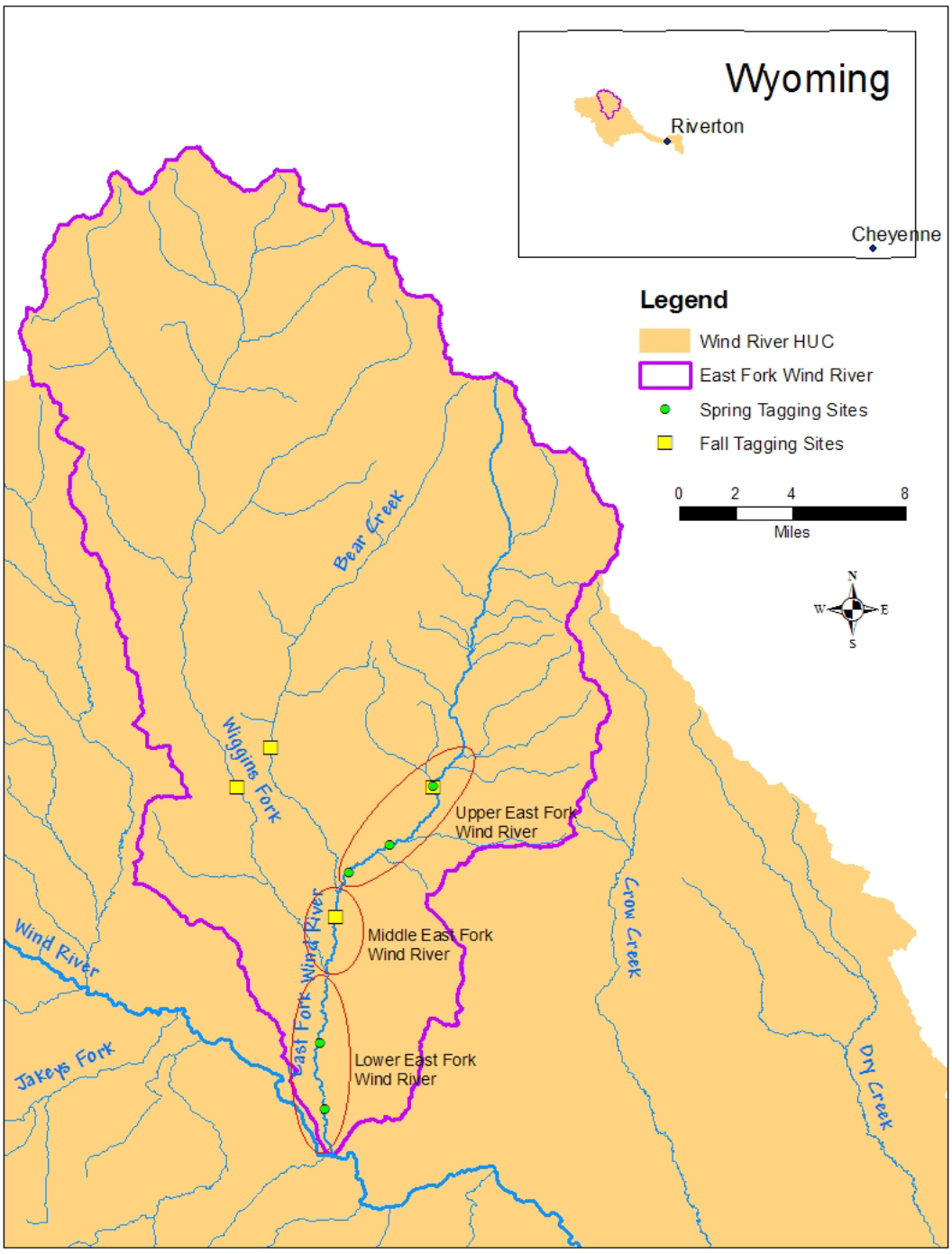

Figure 1. Location of East Fork Wind River Reaches and the East Fork Wind River drainage in the Wind River Drainage and in Wyoming.

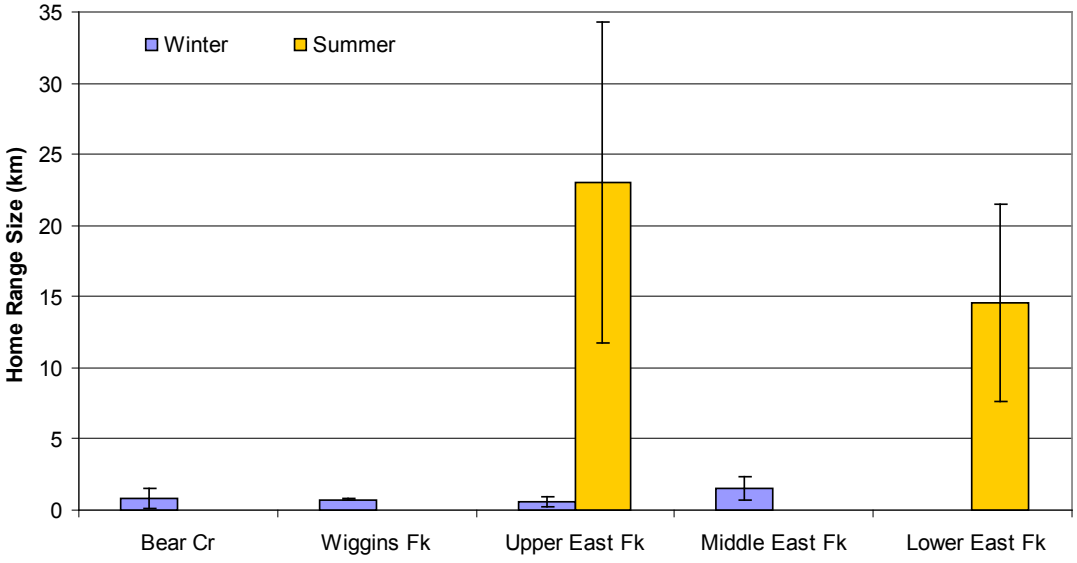

Figure 2. Home range size for cutthroat trout radio-tagged at various locations in the East Fork Wind River drainage during the fall 2008 (winter) and spring 2009 (summer).

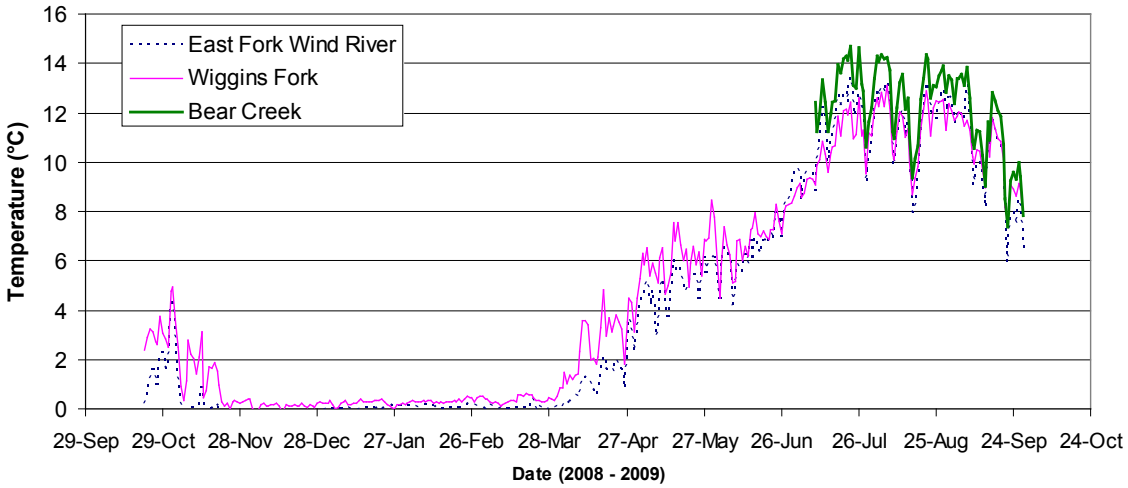

Figure 3. Water temperature at radio-tagging sites on Bear Creek, Wiggins Fork, and upper East Fork Wind River.

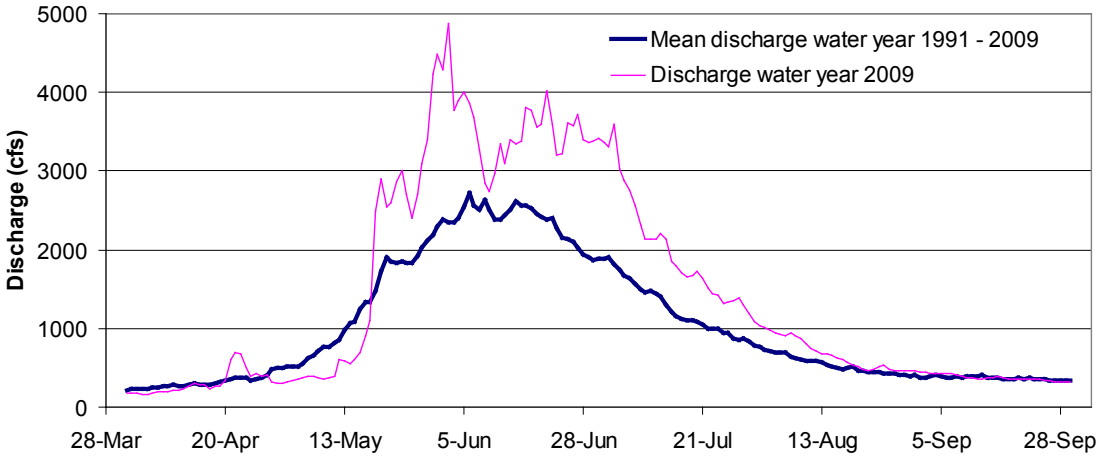

Figure 4. Average and water year 2009 discharge in the Wind River above Red Creek near Dubois Wyoming.

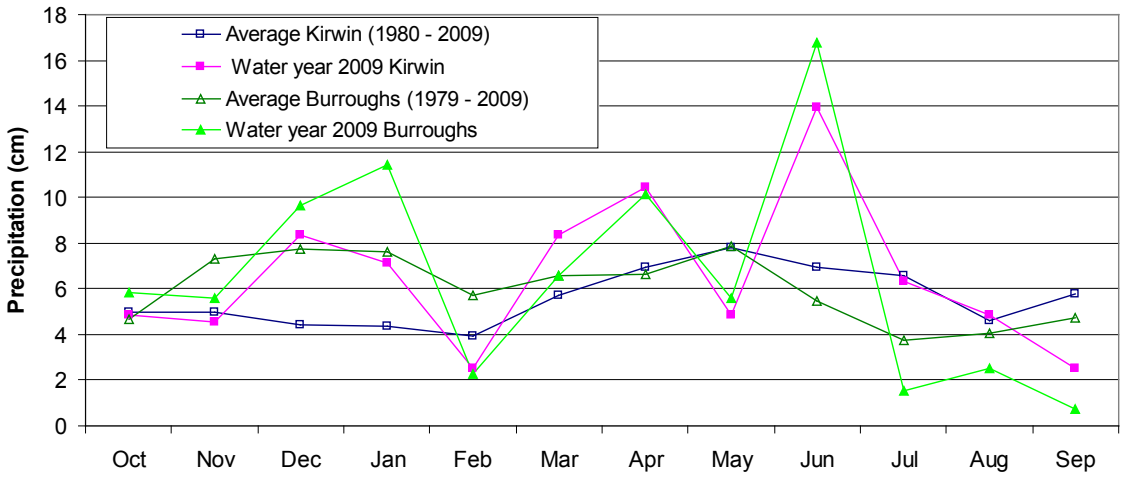

Figure 5. Average and 2009 precipitation by month for the Burroughs site (located immediately west of the East Fork Wind River drainage on Burroughs Creek) and Kirwin site (located immediately north of the East Fork Wind River drainage on the Wood River).

Table 1. Radio-tag number, length, and weight for cutthroat trout implanted with radio-tags in Bear Creek, Wiggins Fork, and the East Fork Wind River during the fall of 2008. Stream where the fish were captured and implanted with radio tags is indicated along with their location (river km) within that or other indicated stream on various dates for which tracking was conducted. On some occasions, tracking took multiple days. Therefore, the date indicated may not be the actual date fish were located in that area, but is near the actual date.

Tag #	Length (cm)	Weight (g)	Stream	30-Sep-08	21-Oct-08	17-Nov-08	16-Dec-08	2-Feb-09	11-Mar-09	19-Mar-09
15	30	320	Bear	10.8	10.8	11	10.8	NT	NT	10.8
35	33	382	Bear	10.8	10.8	11.3	11.3	NT	NT	11.3
56	30	174	Bear	10.8	10.8	10.9	11	NT	NT	11.9
75	28	226	Bear	10.8	10.8	11.1 Dead				
95	27	202	Bear	10.8	10.8	10.8	10.9	NT	NT	10.8
115	30	216	Bear	10.8	10.6	11.4	11.4	NT	NT	11.3
156	27	198	Bear	10.8	11.2	11.5	11.5	NT	NT	11.5
192	35	346	Bear	10.8	11.2	11.3	11.3	NT	NT	11.2
1035	44	890	Bear	10.8	7.2	7.4	7.4	7.2	NT	7.4
223	29	234	Wiggins	12.8	13.4	13.7	13.7	NT	13.3	NT
252	28	238	Wiggins	12.8	13.4	13.5	13.5	NT	13.3	NT
264	30	262	Wiggins	12.8	13	13	13.6	NT	13.3	NT
282	38	490	Wiggins	12.8	13	13.1	13.1	NT	12.3	NT
303	30	266	Wiggins	12.8	13	13.1	13.1	NT	12.4	NT
327	36	450	Wiggins	12.8	12.4	12.5	12.2	NT	12.2	NT
336	32	330	Wiggins	12.8	12.2	12.5	12.5	NT	12.2	NT
345	30	260	Wiggins	12.8	13	13.6	13.6	NT	13.3	NT
346	30	240	Wiggins	12.8	13	13.6	13.6	NT	13.3	NT
356	27	182	Wiggins	12.8	13.6	13.7	13.6	NT	13.3	NT
374	35	428	Wiggins	12.8	13.2	13.4	13.4	NT	13.3	NT
385	30	320	East Fk	28.2	28.8	28.1	28.2	27.9	27.8	28.2
416	29	238	East Fk	28.2	28.2	28.3	28.4	28.1	28.2	28.3
426	42	560	East Fk	28.2	28	27.7	26.7	26.1	26.1	26.8
461	33	338	East Fk	28.2	28	NF	NF	NF	NF	NF
474	36	492	East Fk	28.2	28	28.3	28.3	28.1	28.3	28.3
556	30	274	East Fk	28.2	28	28.3	28.3	28	27.9	28.2
575	26	182	East Fk	28.2	28	28.2	28.2	28.1	28	28.2
608	27	220	East Fk	28.2	28	28.2	28.2	28	28	28.2
795	30	284	East Fk	28.2	28	28.3	28.3	28.1	28.3	28.3
805	34	410	East Fk	28.2	28	28.6	28.3	28.4	28.4	28.6
856	32	324	East Fk	16.2	NF	12	12.3	12	12	12.2 Dead
915	43	800	East Fk	16.2	16.8	17.2	17.2	17.1	17.1	17.4
925	28	218	East Fk	16.2	NF	18	18	17.4	17.4	17.6
945	30	302	East Fk	16.2	17.2 Dead					
955	31	288	East Fk	16.2	NF	NF	NF	NF	NF	NF
968	32	312	East Fk	16.2	16.8	16.9	17.1	16.9	16.9	17.1 Dead
975	29	230	East Fk	16.2	NF	18.1	18.1	17.7	17.7	18.1
995	28	240	East Fk	16.2	16.4	16.9	17.1	16.8	16.8	17
1054	26	188	East Fk	16.2	16	13.1	13.3	13.1	13.1	13.1
1085	29	242	East Fk	16.2	NF	16.3	16.3	16.1	16.1	NF
1185	26	176	East Fk	16.2	NF	1.2 Bear Cr	1.4 Bear Cr	1.3 Bear Cr	1.3 Bear Cr	NF

NT = Not Tracked (i.e. no attempt was made to locate that fish)
NF = Not Found (i.e. a search for that fish was made but the fish was not located)

Table 2. Radio-tag number, length, and weight for cutthroat trout implanted with radio-tags in the East Fork Wind River during the spring of 2009. Stream where the fish were captured and implanted with radio tags is indicated along with their location (river km) within that or other indicated stream on various dates for which tracking was conducted. On some occasions, tracking took multiple days. Therefore, the date indicated may not be the actual date fish were located in that area, but is near the actual date.

Tag #	Length (cm)	Weight (g)	Stream	6-Apr-09	22-Apr-09	May	3-Jun-09	30-Jun-09	31-Jul-09	2-Sep-09	21-Sep-09
1575	26	180	East Fk		19.4	NF	NF	NF	NF	NF	NF
1306	29	266	East Fk		19.4	NF	2.4	NF	NF	2.4	0.5
1028	26	210	East Fk		19.4	158.2 Wind	158.2 Wind	179.7 Wind	179.7 Wind	179.8 Wind	179.7 Wind
1275	39	538	East Fk		19.4	20.3	24.4	6	NF	NF	NF
1145	30	264	East Fk		22.6	8.6	8.3	8.4	8.1	NF	8
1525	27	194	East Fk		28.2	NF	NF	NF	NF	NF	NF
1129	27	214	East Fk	7.4	NT	NF	NF	NF	NF	NF	NF
1264	28	248	East Fk	7.4	NT	7.9	7.7	7.6	7.4	7.6	
1494	29	274	East Fk	7.4	NT	NF	NF	NF	NF	NF	NF
1298	32	326	East Fk	7.4	NT	NF	NF	NF	NF	NF	NF
1425	33	334	East Fk	7.4	NT	7.9	8	7.4 Bear Cr	NF	NF	10
1956	35	406	East Fk	7.4	NT	NF	30	8	7.8	7.6	6.7
1094	35	426	East Fk	7.4	NT	5.4	5.8	6.2	6.8	Caught by fisherman	
1204	35	428	East Fk	2.9	NT	6.2	7.8	7.9 Bear Cr	6.7 Bear Cr	15.8	13.9
1335	40	630	East Fk	7.4	NT	6.9	7	27.5	7.4	7.1	6.7
1215	45	1110	East Fk	7.4	NT	7.9	6.5 Bear Cr	5.4 Bear Cr	Dead - entrained adjacent to 1.6 Bear Cr		

NT = Not Tracked (i.e. no attempt was made to locate that fish)
NF = Not Found (i.e. a search for that fish was made but the fish was not located)