Statewide Fisheries Survey, 2009
Survey of Public Waters
Part 1 - Streams
Region 1

South Dakota
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Statewide Fisheries Surveys, 2009
Survey of Public Waters
Part 1 – Streams
Region 1

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PREFACE

Fish populations in Black Hills' streams were surveyed during May through September 2009 to monitor fish populations and to gain an understanding of the distribution and relative abundances of fish within the Southern Black Hills' Watersheds. Watersheds that were included in the survey were Spring Creek, Battle Creek, French Creek, Lame Johnny Creek, Beaver Creek, Pass Creek, Red Canyon Creek, and Fall River. A more intense survey was performed on the Castle Creek Watershed.

Copies of this report and references to the data can be made with permission from the authors and the Director of the Division of Wildlife. South Dakota Department of Game, Fish, and Parks, 523 E. Capitol, Pierre, South Dakota, 57501-3182.

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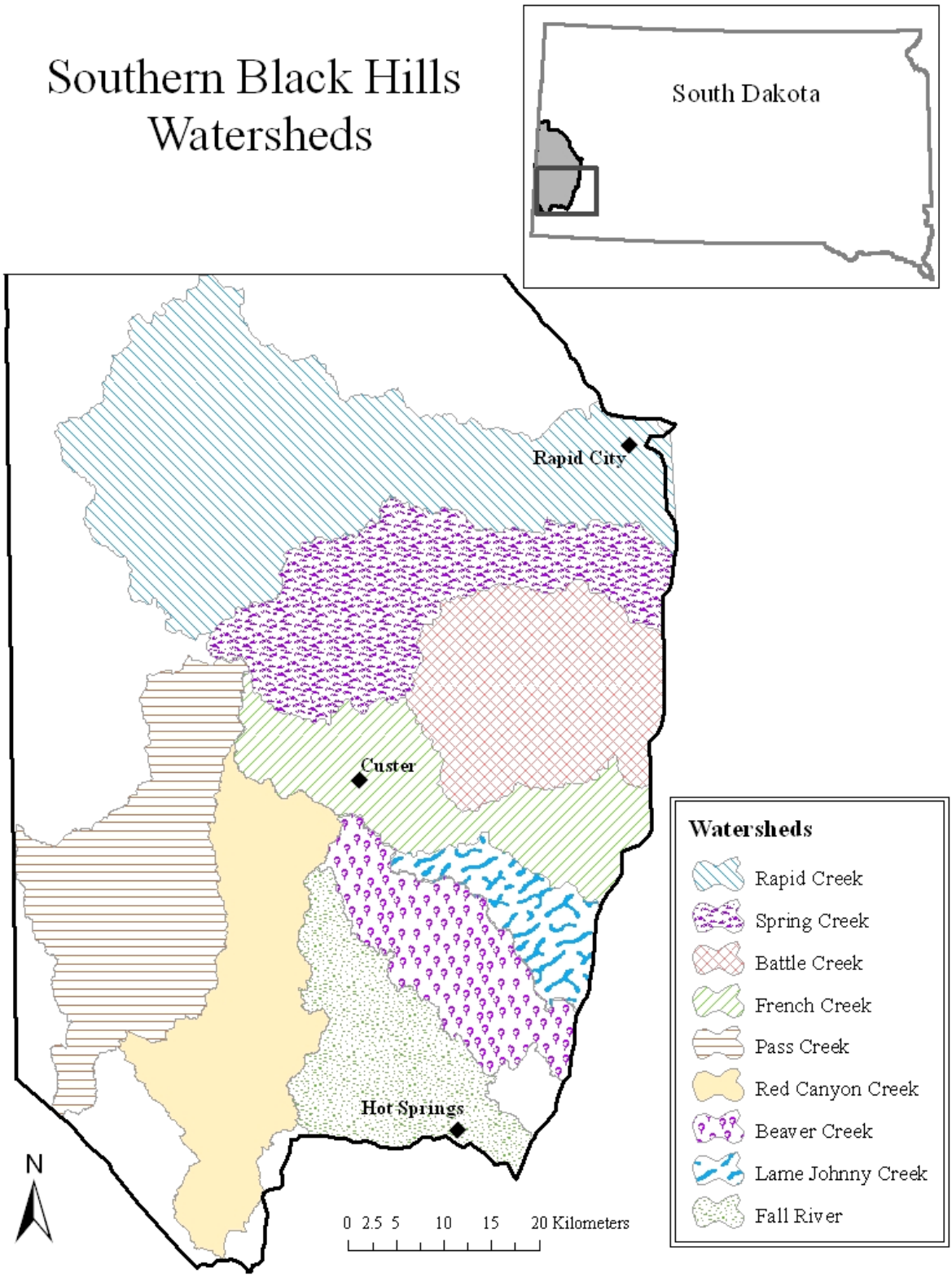

Figure 1: Watersheds included in the fisheries stream survey sampled during the 2009 season are depicted within the Black Hills Trout Management Area.

Methods

Sample Selection

Efforts were made to sample every stream in southern Black Hills watersheds that contained water during the 2009 season. Sites were selected for sampling based first on where sites had previously been surveyed. If previous sites were un-suitable for sampling due to location on private land, lack of water, or other reasons then new sites were created.

Sample Methods

Efforts were made to satisfy the assumptions 1) the population is static, 2) capture probability remained constant across sampling periods, and 3) all fish in the population are equally vulnerable to capture (Van Den Avyle and Hayward 1999; Hayes et al. 2007). All sample reaches were 100 meters in length. Block nets were set at the upstream boundaries for one pass surveys and at both the upstream and down stream boundaries for multiple pass surveys to prevent fish from emigrating or immigrating within the sample site. One pass was made with a single backpack electrofishing unit in all creeks, except for those in the Castle Creek Watershed. During the Castle Creek Watershed survey, three or more passes were made with one or two backpack electrofishing units. Captured fish were anesthetized with carbon dioxide. Most species of fish were measured to the nearest millimeter total length (TL), weighed to the nearest gram, and returned to the stream. After 50 individual lengths and weights were collected from small trout (< 100 mm) of a specific species, bulk counts were collected to expedite data collection. Non-game fish were generally only counted, not weighed or measured. Relative abundance was calculated as CPUE (number of fish captured per 100 meters of stream) and was compared to the first pass of historical data sites when sampling occurred within comparable months. As a result of the small sample size, caution must be given when interpreting the data and extrapolating it to the entire stream.

In addition to fish data, pH, temperature, and specific conductance were measured and recorded. Stream widths were also measured every ten meters and averaged to obtain an estimate of total area sampled to calculate density of fish (number per 100 m^2. Stream flow data was also downloaded from the USGS web site for water years 1996-2009 (available at: http://waterdata.usgs.gov/sd/nwis).

Castle Creek

County: Pennington

Fish populations in Castle Creek and South Fork Castle Creek were surveyed during the summer of 2009. The goal of the survey was to determine the current status of fish populations in Castle Creek and establish a baseline for future monitoring and research. Historically, surveys on Castle Creek were focused on smaller sections of the stream. The intention of this survey was to intensively sample Castle Creek and South Fork Castle Creek to garner a better understanding of the fish populations along the entire length of these creeks. This survey occurred at a different time of year and was more intensive than previous surveys. Therefore, results of this survey can not be compared to historic surveys and will be used to establish a baseline in which future surveys may be compared.

Study Area

Castle Creek (CAS) is a tributary of Rapid Creek in the Rapid Creek Watershed (Figure 2). The headwaters of Castle Creek are located approximately 17 km south southwest of the town of Hanna. Castle Creek flows southeast approximately 22 km where it enters Deerfield Reservoir, the only reservoir on Castle Creek. South Fork Castle Creek is a tributary of Castle Creek entering Castle Creek from the south approximately 400 meters upstream of Deerfield Reservoir. Castle Creek upstream of Deerfield Reservoir drains approximately 23,600 ha. Castle Creek flows out of Deerfield Dam in a northeasterly direction for approximately 37 km where it confluences with Rapid Creek near the town of Mystic. Castle Creek below Deerfield Reservoir drains approximately 14,000 ha.

Castle Creek and its tributaries are managed under standard Black Hills Trout Management Area regulations with a daily limit of five trout (in any combination) with one allowed 355 mm, 14 inches, or longer. In 2009, 150 catchable 279 mm (11 in) rainbow trout were stocked in Castle Creek above Deerfield Reservoir and 100 catchable rainbow trout were stocked in South Fork Castle Creek. Below Deerfield Reservoir, 1,380 catchable rainbow trout were stocked into Castle Creek.

Methods

The study area was divided into four segments (Figure 3). Sample reaches measuring 100 m in length were randomly selected within each segment using a random number generator. Segment 1 started at the confluence with Rapid Creek and ended 25.2 km upstream at the confluence with North Fork Castle Creek (Figure 4). This segment had an average slope of 0.9% and the highest discharge of the four segments. Eleven sample reaches were selected in segment 1. Segment 2 started at the confluence with North Fork Castle Creek and ended 11.2 km upstream at Deerfield Dam (Figure 5). This segment had an average slope of 1.0 % and the second highest discharge of the four segments. Six sample reaches were selected in segment 2. Segment 3 started at the

inlet to Deerfield Reservoir and ended 5.7 km upstream (Figure 6). Segment 3 ended at this location because most of the stream upstream of this location is located on private land. This segment was typical of a headwater stream, being smaller in size and discharge than segments 1 and 2 and had a higher average slope of 1.4%. Seven sample reaches were selected in segment 3. The South Fork Castle Creek segment (CCS) included the entire 16.8 km from the confluence with Castle Creek to the headwaters (Figure 7). This segment had an average slope of 1.6 % and was similar in size and discharge to segment 3. Five reaches were sampled in the CCS segment.

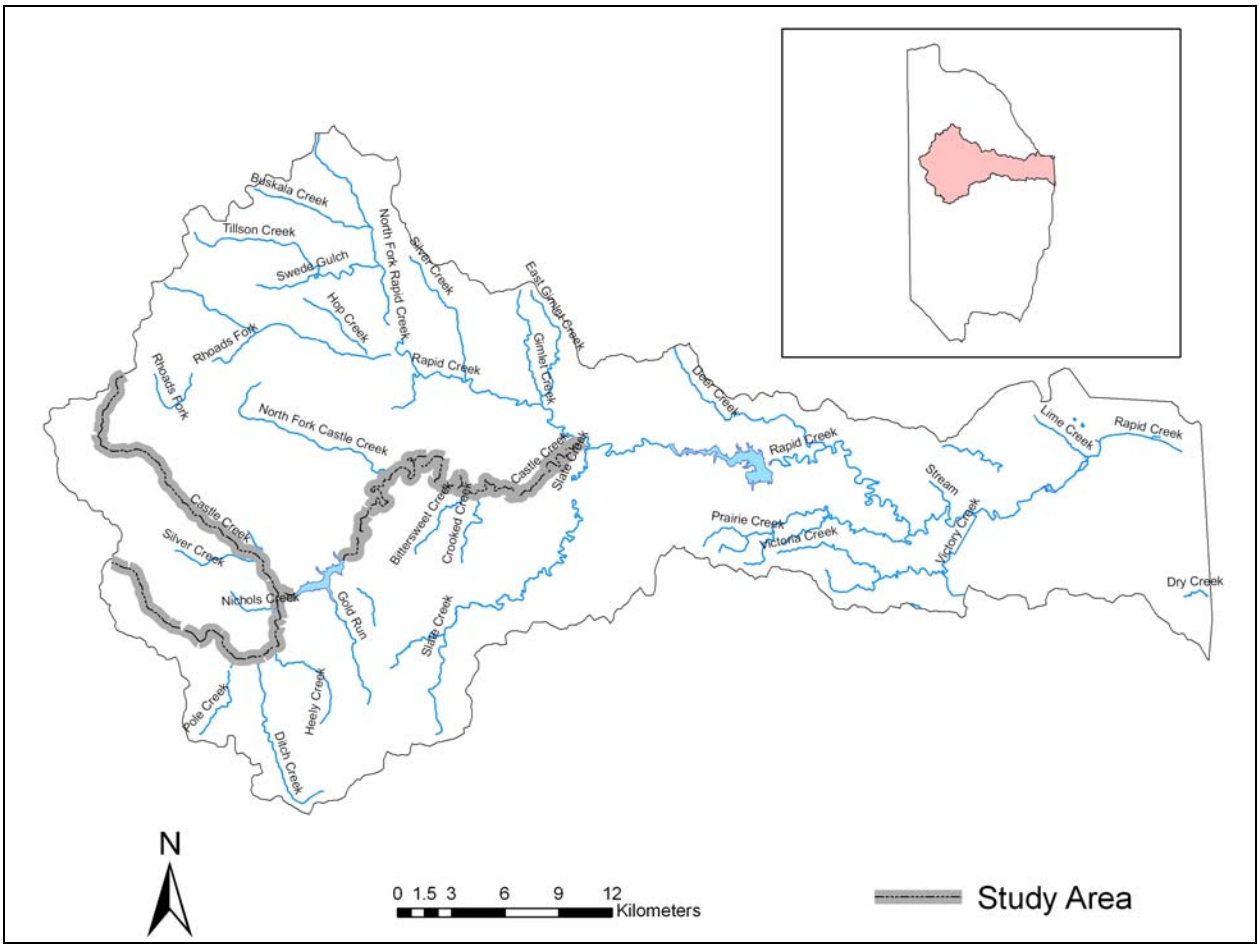

Figure 2: Map of the Rapid Creek Watershed indicating the study area of Castle Creek and South Fork Castle Creek.

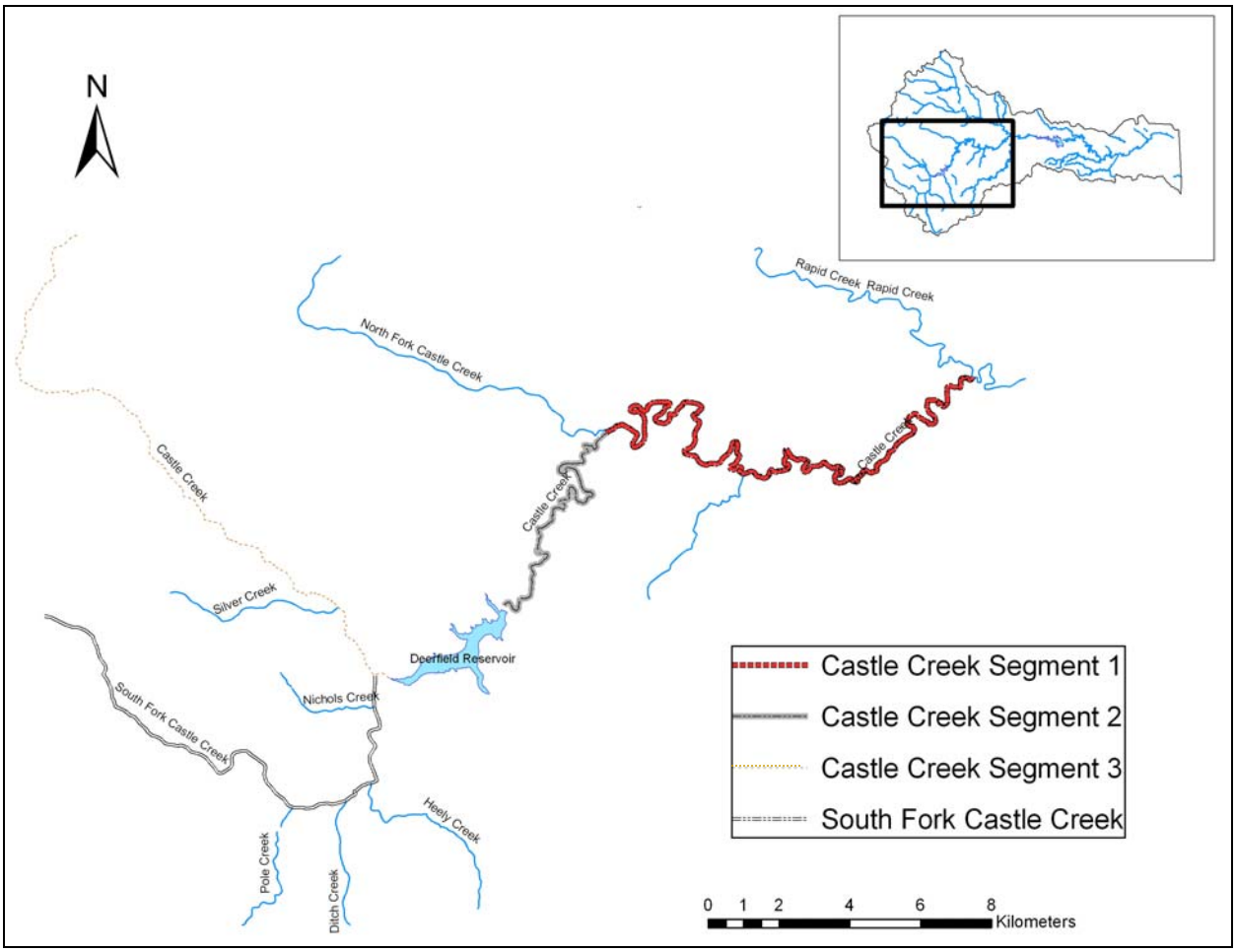

Figure 3: Map of the Castle Creek study area with study segments defined.

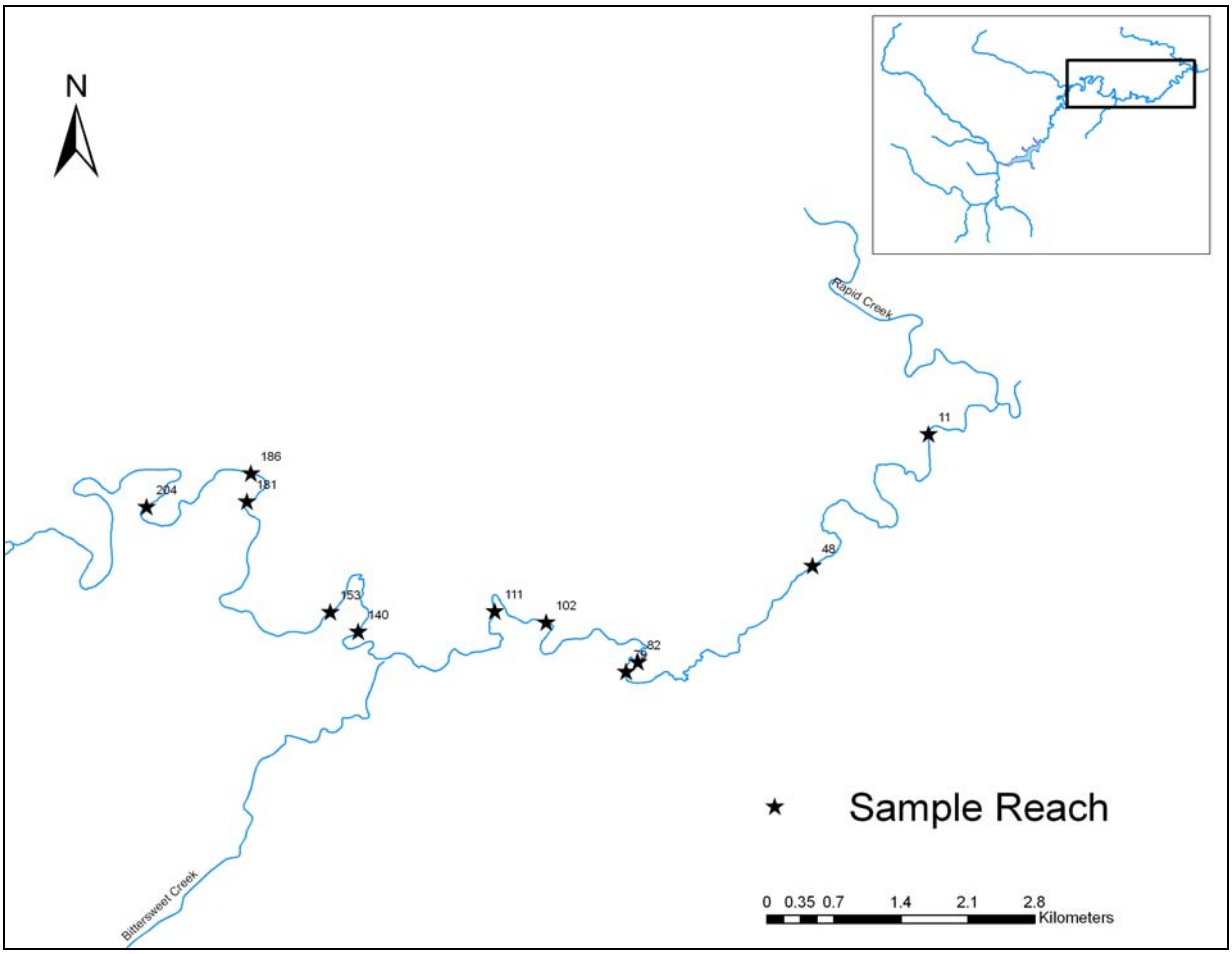

Figure 4: Segment 1 of the Castle Creek study area with sample locations denoted by a star.

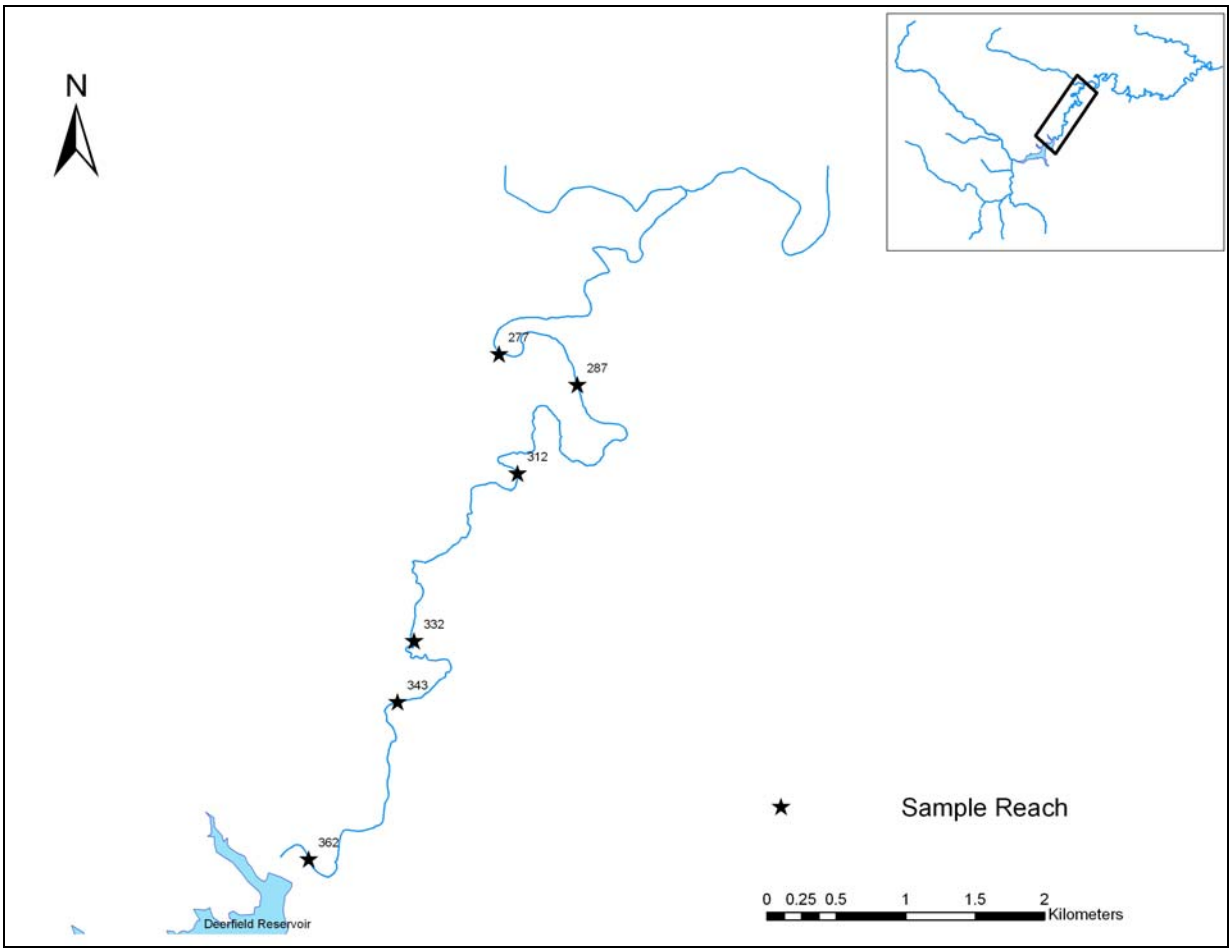

Figure 5: Segment 2 of the Castle Creek study area with sample locations denoted by a star.

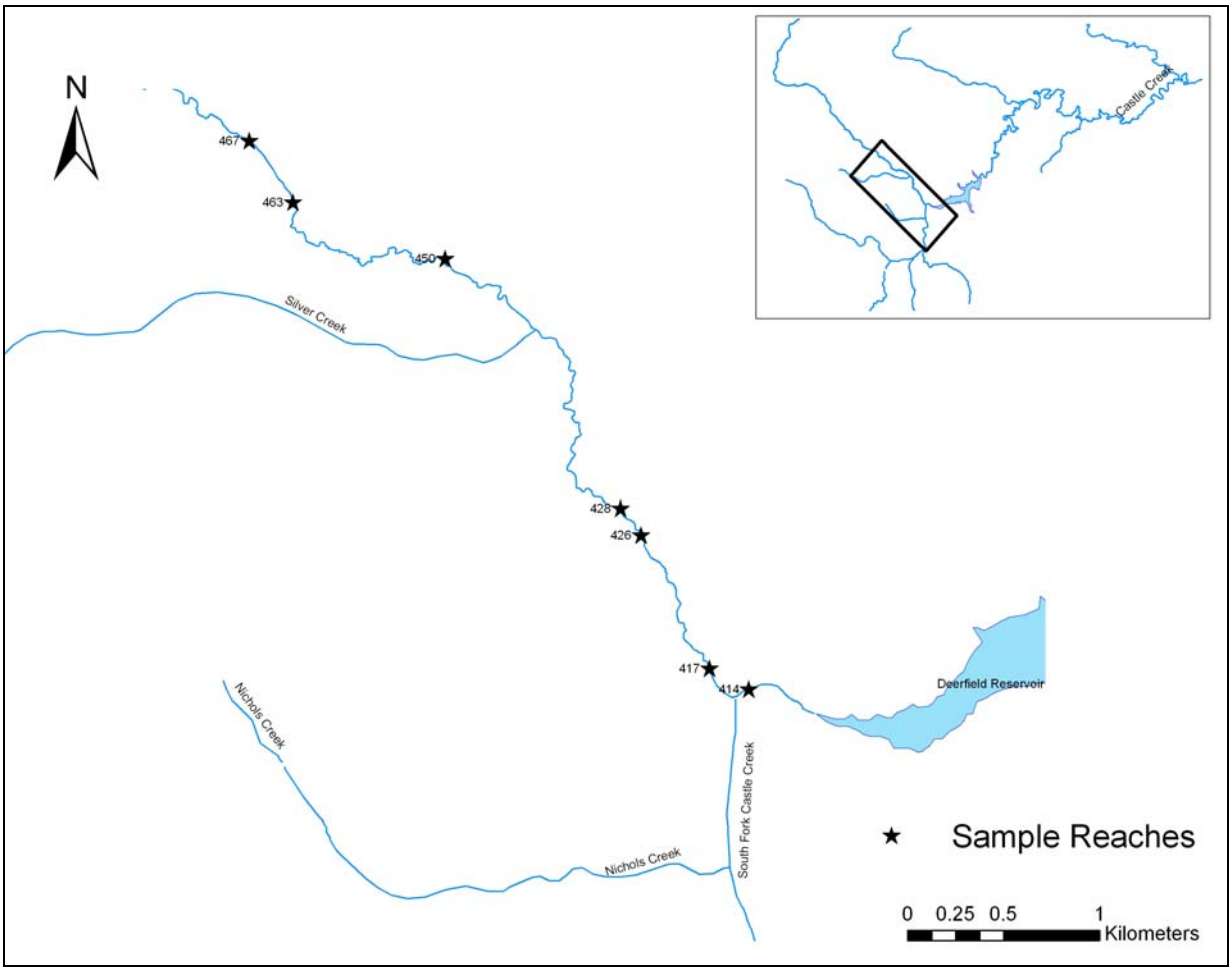

Figure 6: Segment 3 of the Castle Creek study area with sample locations denoted by a star.

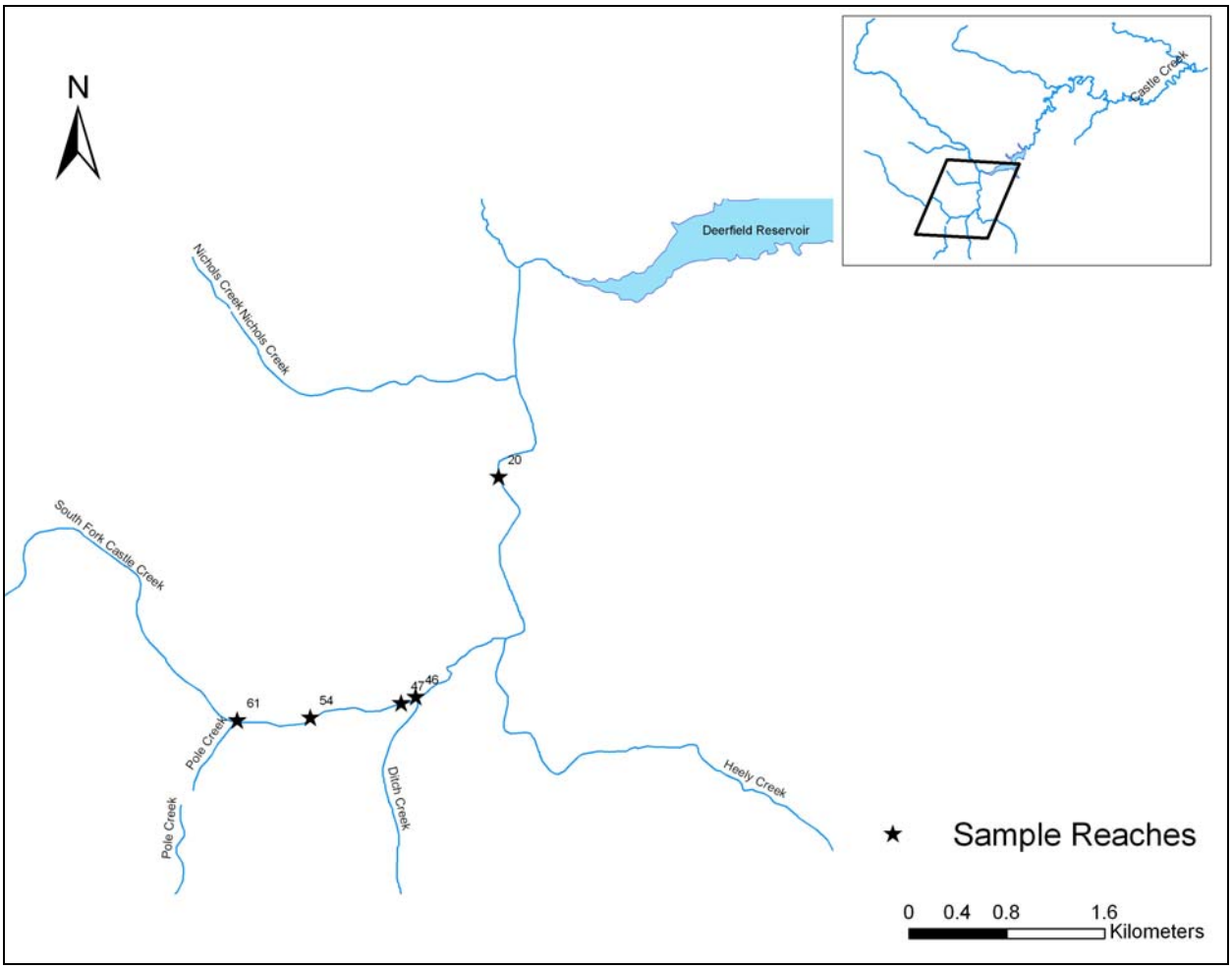

Figure 7: South Fork Castle Creek segment (CCS) of the Castle Creek study area with sample locations denoted by a star.

Results

Segment 1

A total of 357 fish covering five species were sampled in segment 1 (Table 2). The fish community was dominated by brown trout accounting for 95% of the total fish captured. Few individuals of the other four species were captured indicating they are rare in segment 1 and will not be discussed further.

Brown trout – Segment 1 averaged 4.8 adult brown trout per 100 m of stream and had a mean density of 1.0 fish/100 m^2. The density of brown trout in segment 1 resulted in this segment being classified as a class 2 brown trout fishery (0.6 – 3.6 adult fish per 100 m^2; Erickson et al. 1993). Juvenile brown trout averaged 26.4 fish per 100 m at a mean density of 5.7 fish per 100 m^2.

Examination of cumulative length frequency indicated approximately 80% of the brown trout in segment 1 are smaller than 200 mm and more than 95% were smaller than 240 mm (Figure 8). Length frequency analysis was only able to distinguish age-1 brown trout at a size between 100 and 130 mm (Figure 9). The apparent lack of fish less than 100 mm may be the result of poor spawning success, but is more likely the result of sampling occurring earlier in the year. Fish that emerged in the spring likely have not recruited to the sampling gear.

Segment 2

A total of 330 fish covering three species were sampled in segment 2 (Table 2). Brown trout were most abundant accounting for 59% of the total catch. Brook trout were also relatively abundant accounting for over 40% of the catch. Only one white sucker was captured indicating this species is rare in segment 2.

Brown trout – Segment 2 averaged 9.2 adult brown trout per 100 m of stream and had a mean density of 1.7 fish/100 m^2. The density of brown trout in segment 1 resulted in this segment being classified as a class 2 brown trout fishery (0.6 – 3.6 adult fish per 100 m^2). Juvenile brown trout averaged 26.0 fish per 100 m at a mean density of 5.0 fish per 100 m^2.

Examination of cumulative length frequency indicated approximately 74% of the brown trout in segment 2 are smaller than 200 mm and more than 95% were smaller than 270 mm (Figure 10). Length frequency analysis was only able to distinguish age-1 fish at a size between 120 and160 mm (Figure 11). Again, the apparent lack of fish less than 100 mm is likely due to age-0 fish that have not recruited to the sampling gear.

Brook trout – Segment 2 averaged 5.7 adult brook trout per 100 m of stream and had a mean density of 1.0 fish/100 m^2. The density of brook trout in segment 1 resulted in this segment being classified as a class 2 brook trout fishery (0.6 – 3.6 adult fish per 100 m^2). Juvenile brown trout averaged 17.0 fish per 100 m at a mean density of 3.5 fish per 100 m^2.

Examination of cumulative length frequency indicated approximately 74% of the brook trout in segment 2 are smaller than 200 mm and more than 95% were smaller than 250 mm (Figure 12). Length frequency analysis was able to distinguish age-1 fish at a size between 120 and160 mm (Figure 13). Again, the apparent lack of fish less than 100 mm is likely do to age-0 fish that have not recruited to the sampling gear.

Segment 3

A total of 669 fish covering three species were sampled in segment 3 (Table 2). The fish community was dominated by brook trout accounting for about 87% of the total fish captured. The rainbow trout sampled were mostly smaller fish which indicated this segment may be important for rainbow trout reproduction. Further investigation is needed to determine to what degree this natural reproduction is contributing to the fishery. Segment 3 was the only segment in which rock bass were present. Rock bass were found in two sites in segment 3 and maybe fish that have moved up from Deerfield Reservoir.

Brook trout – Segment 3 averaged 1.7 adult brook trout per 100 m of stream and had a mean density of 0.6 fish/100 m^2. The density of brook trout in segment 1 resulted in this segment being classified as a class 2 brook trout fishery (0.6 – 3.6 adult fish per 100 m^2). Juvenile brown trout averaged 82.6 fish per 100 m at a mean density of 32.9 fish per 100 m^2.

Examination of cumulative length frequency indicated the size structure of brook trout in segment 3 was smaller than that of brook trout populations below Deerfield Dam with more than 95% of the fish being smaller than 180 mm (Figure 14). Length frequency analysis indicated the presence of age-0 brook trout at a length less than 100 mm and age-1 fish at a size between 120 and 160 mm (Figure 15).

South Fork Castle Creek (CCS)

A total of 589 fish covering two species were sampled in South Fork Castle Creek (CCS) (Table 2). The fish community was dominated by brook trout accounting for about 97% of the total fish captured. The rainbow trout sampled were mostly smaller individuals which indicated this segment may also be important for rainbow trout reproduction. Further investigation is needed to determine to what degree this natural reproduction is contributing to the fishery.

Brook trout – CCS averaged 9.8 adult brook trout per 100 m of stream and had a density of 3.0 fish/100 m^2. The density of brook trout in CCS is consistent with that of a class 2 brook trout fishery (0.6 – 3.6 adult fish per 100 m^2). Juvenile brown trout averaged 142.2 fish per 100 m at a mean density of 61.3 fish per 100 m^2.

Examination of cumulative length frequency indicated approximately 92% of the brook trout in CCS are smaller than 200 mm and about 95% were smaller than 240 mm (Figure 16). Length frequency analysis indicated the presence of young-of-the-year fish at a length less than 100 mm (Figure 17). No other year classes were clearly discernible, but it appears that age-1 fish probably occurred at lengths between 120 and 140 mm.

Table 1: Common names, scientific names, and abbreviations of all fish species captured during the 2009 survey.

Common Name	Scientific Name	Abbreviation
Brook trout	*Salvelinus fontinalis*	BKT
Brown trout	*Salmo trutta*	BNT
Rainbow trout	*Oncorhynchus mykiss*	RBT
Longnose dace	*Rhinichthys cataractae*	LND
White sucker	*Catostomus commersonii*	WHS
Mountain sucker	*Catostomus platyrhynchus*	MTS
Creek chub	*Semotilus atromaculatus*	CRC
Golden shiner	*Notemigonus crysoleucas*	GOS
Black bullhead	*Ameiurus melas*	BLB
Northern pike	*Esox lucius*	NOP
Yellow perch	*Perca flavescens*	YEP
Brook stickleback	*Culaea inconstans*	BRS
Rock bass	*Ambloplites rupestris*	ROB

Table 2: Number of each species captured in each segment during summer 2009 Castle Creek sampling.

Species	Segment 1	Segment 2	Segment 3	CCS
Brown trout	339	195		
Brook trout	1	134	584	571
Rainbow trout	9		39	18
White sucker	7	1		
Mountain sucker	1			
Rock bass			46	

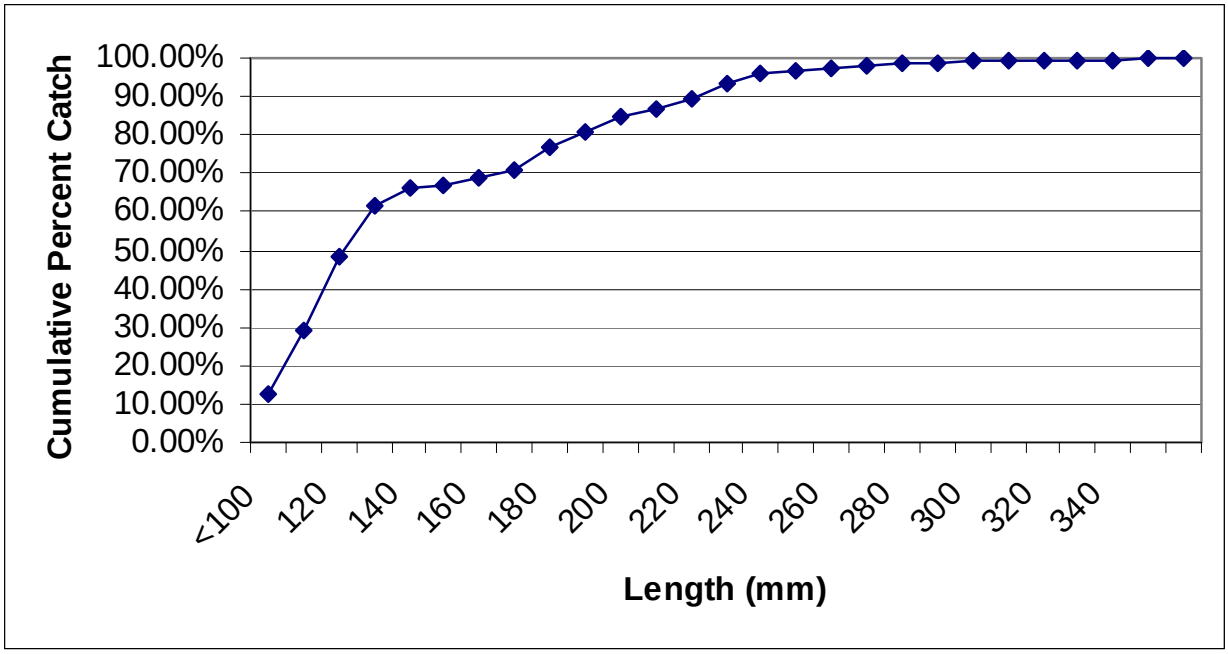

Figure 8: Cumulative length frequency of brown trout captured in segment 1 of the Castle Creek during June and July 2009 fish population survey.

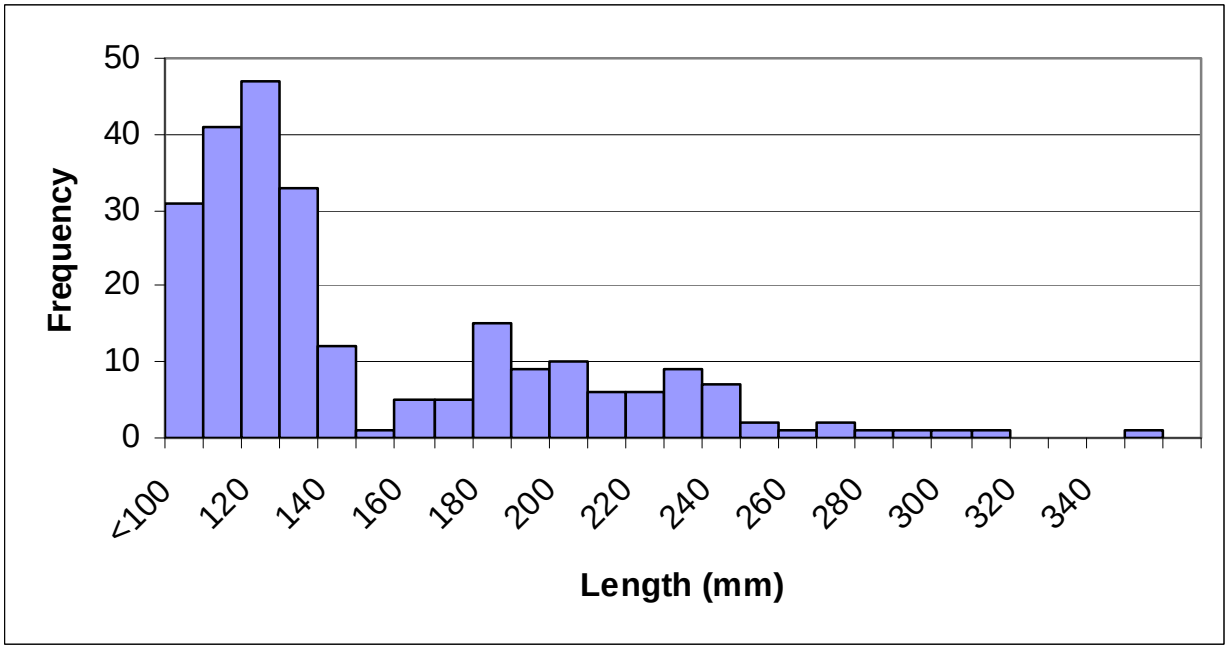

Figure 9: Length frequency of brown trout captured in segment 1 of the Castle Creek fish captured during June and July 2009 population survey.

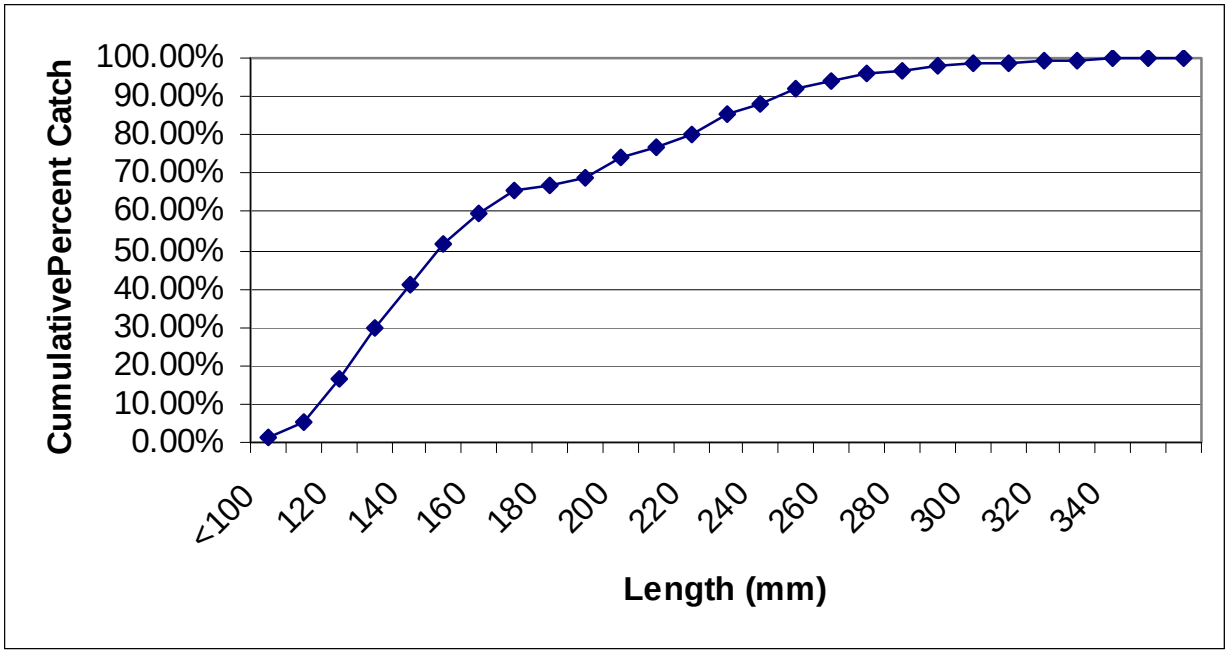

Figure 10: Cumulative length frequency of brown trout captured in segment 2 of the June and July 2009 Castle Creek fish population survey.

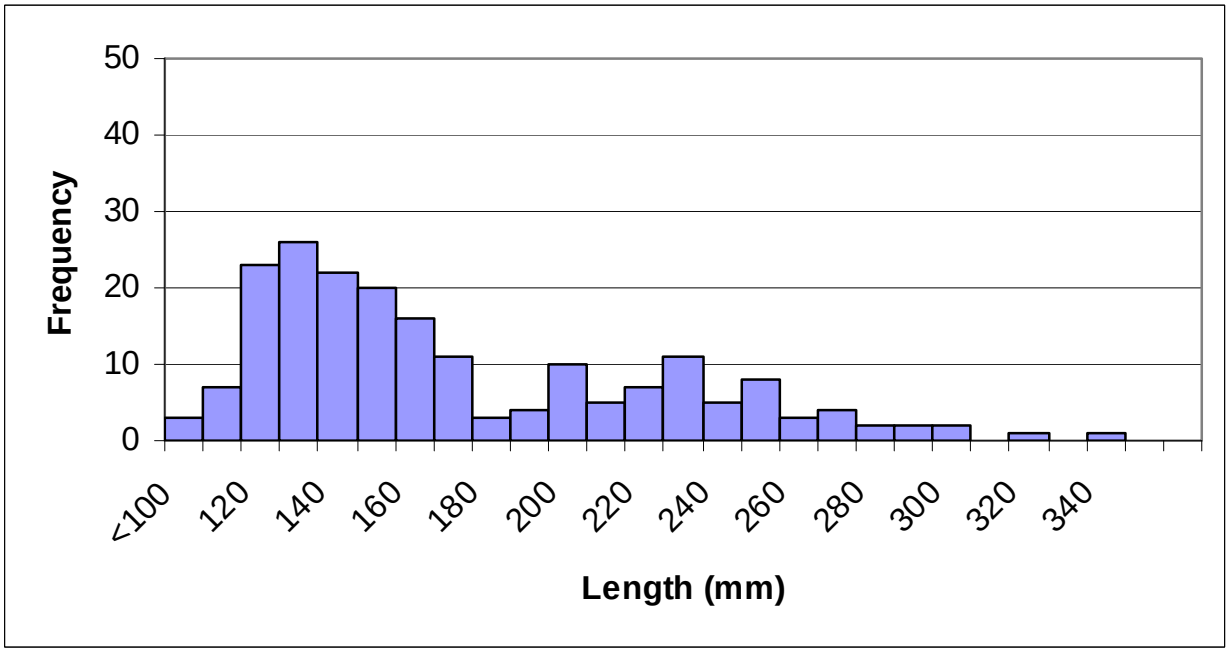

Figure 11: Length frequency of brown trout captured in segment 2 of the June and July 2009 Castle Creek fish population survey.

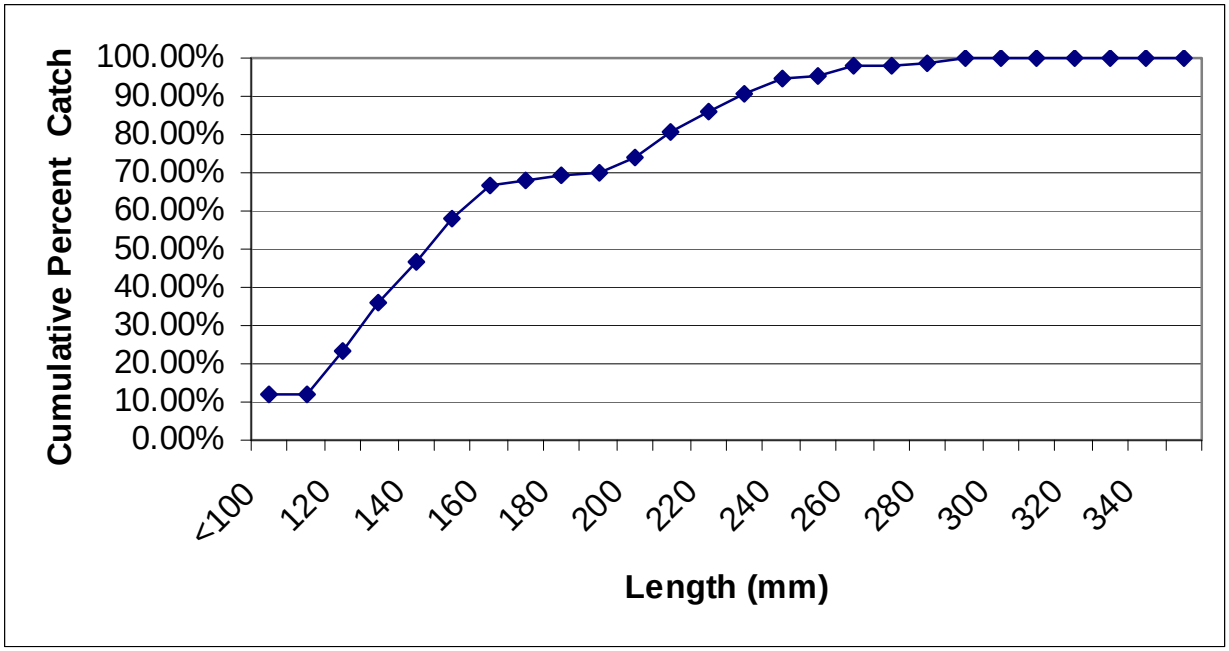

Figure 12: Cumulative length frequency of brook trout captured in segment 2 of the June and July 2009 Castle Creek fish population survey.

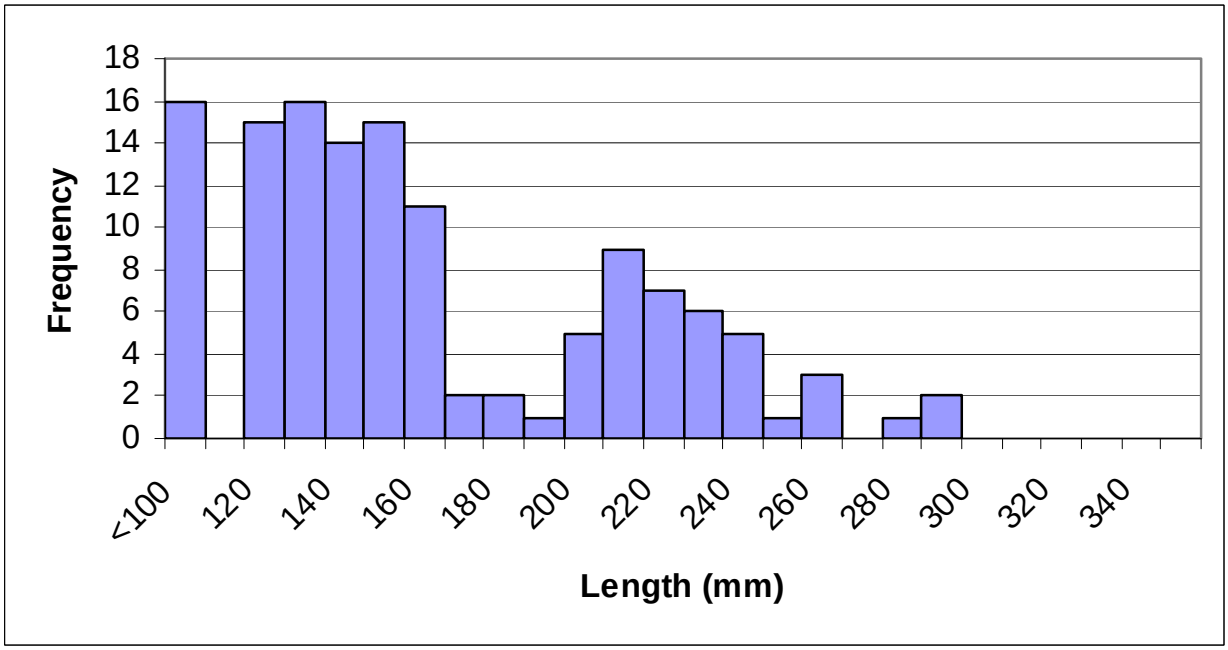

Figure 13: Length frequency of brook trout captured in segment 2 of the June and July 2009 Castle Creek fish population survey.

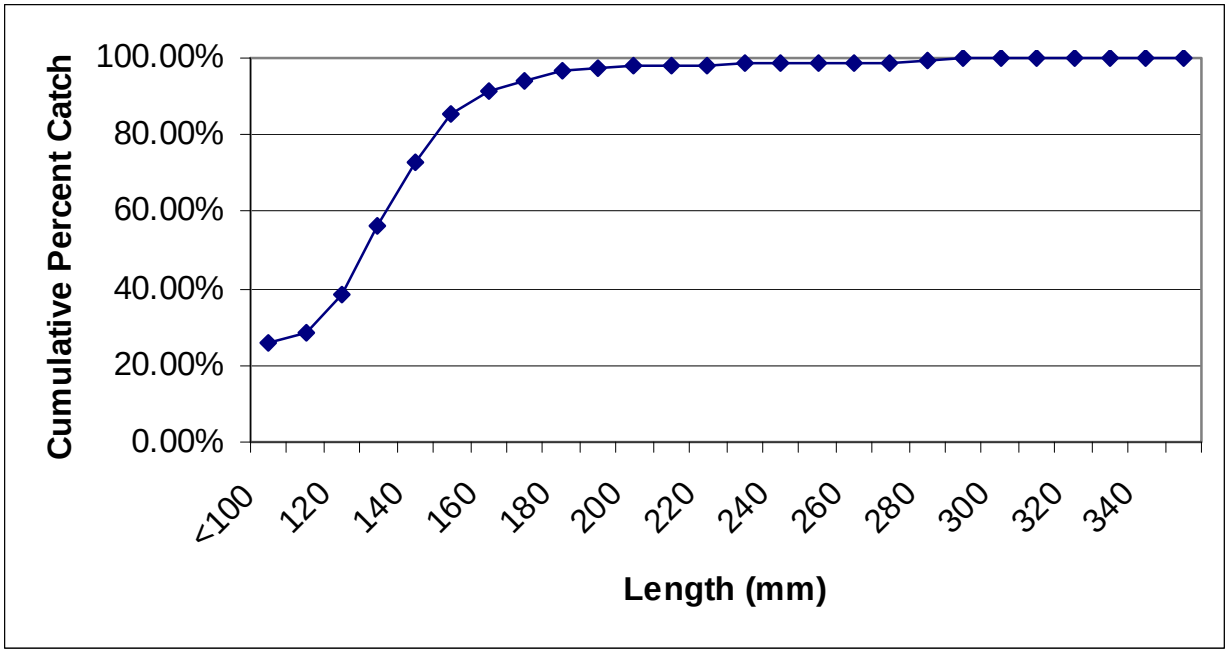

Figure 14: Cumulative length frequency of brook trout captured in segment 3 of the June and July 2009 Castle Creek fish population survey.

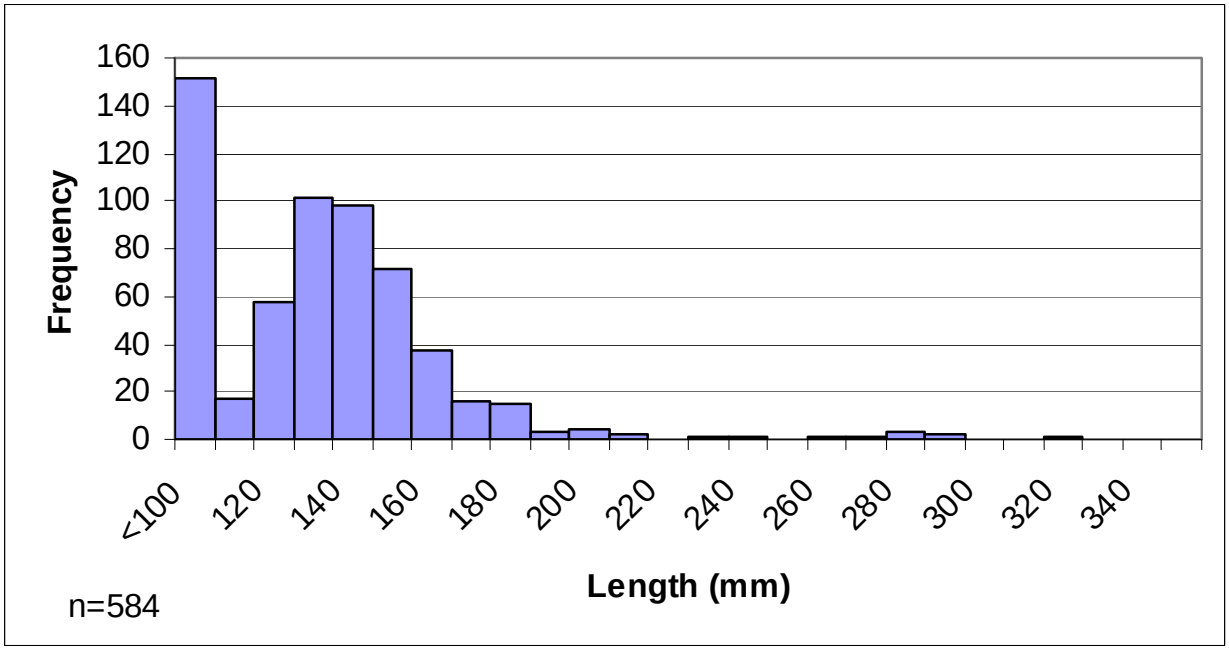

Figure 15: Length frequency of brook trout captured in segment 3 of the June and July 2009 Castle Creek fish population survey.

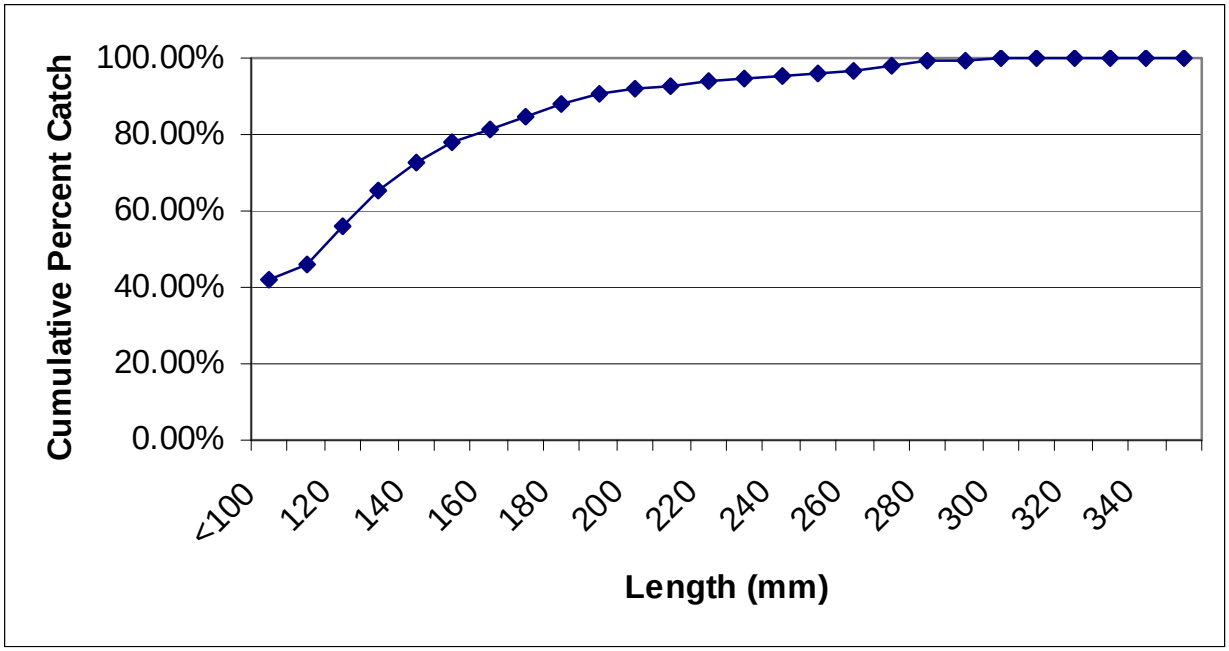

Figure 16: Cumulative length frequency of brook trout captured in CCS of the June and July 2009 Castle Creek fish population survey.

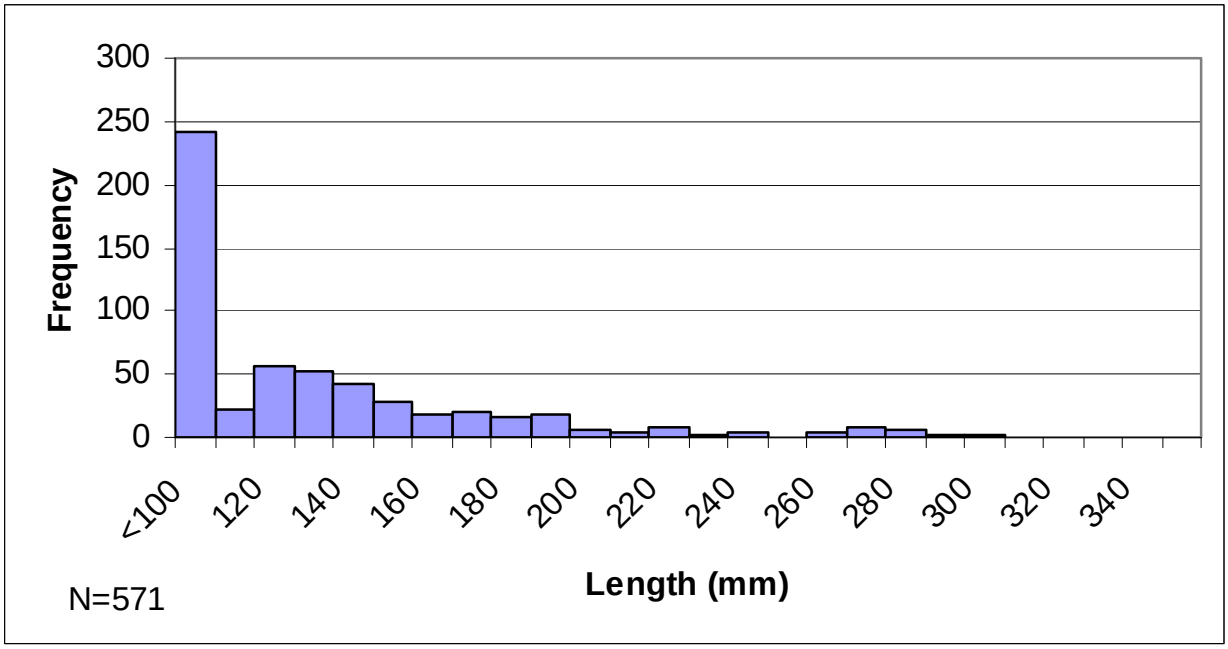

Figure 17: Length frequency of brook trout captured in CCS of the June and July 2009 Castle Creek fish population survey.

Recommendations

1. Continue to stock catchable trout in segment 1 of Castle Creek to provide stream angling opportunities.

2. Continue to manage Castle Creek under standard Black Hills Trout Management Area regulations of five trout daily with only one larger than 14 inches.

3. Perform similar intensive surveys every three years to monitor trends in fish populations in Castle Creek.

4. Conduct a research project to determine the contribution of naturally reproducing rainbow trout to the fishery.

5. Determine which if any strain of fish currently stocked into Deerfield may be responsible for natural reproduction that is observed in upper Castle Creek and South Fork Castle Creek.

Spring Creek Watershed

Counties: Pennington

Fish populations in the Spring Creek Watershed within the Black Hills Trout Management Area (BHTMA) (Figure 1) were surveyed during May through August 2009 to monitor fish populations. The Spring Creek Watershed lies between Rapid Creek and Battle Creek Watersheds (Figure 18). The headwaters of Spring Creek lie about eleven miles west of Hill City and the creek flows east through Hill City and enters Sheridan Lake approximately 4.5 miles (7.2 km) east north east. After exiting Sheridan Lake, Spring Creek flows east until it drains into the Cheyenne River southwest of Wasta. The creek does experience a loss zone (where flow is lost to underlying geologic units) near Hwy 79 north of Hermosa and is intermittent from the town of Rockerville down stream most years. The Spring Creek Watershed within the BHTMA is in a pine/spruce forest and managed by the US Forest Service. As with the rest of the Black Hills, many forest service roads cut through the watershed with a few houses and ranches present. Sections of Spring Creek as well as Newton Fork Dam, Sheridan, Sylvan, Sunday Gulch, Mitchell, and Major Lakes are all currently stocked with rainbow trout. Spring Creek and its tributaries are managed under standard regulations with a daily limit of five trout (in any combination) with one allowed 14 inches or longer.

Sample Locations

Eight reaches in Spring Creek, two reaches in Horse Creek, and one reach in each of Newton Fork Creek, Palmer Gulch, Sunday Gulch, Tenderfoot Creek, Vonderlehr Creek, and Willow Creek (Figure 18) were surveyed May through August 2009.

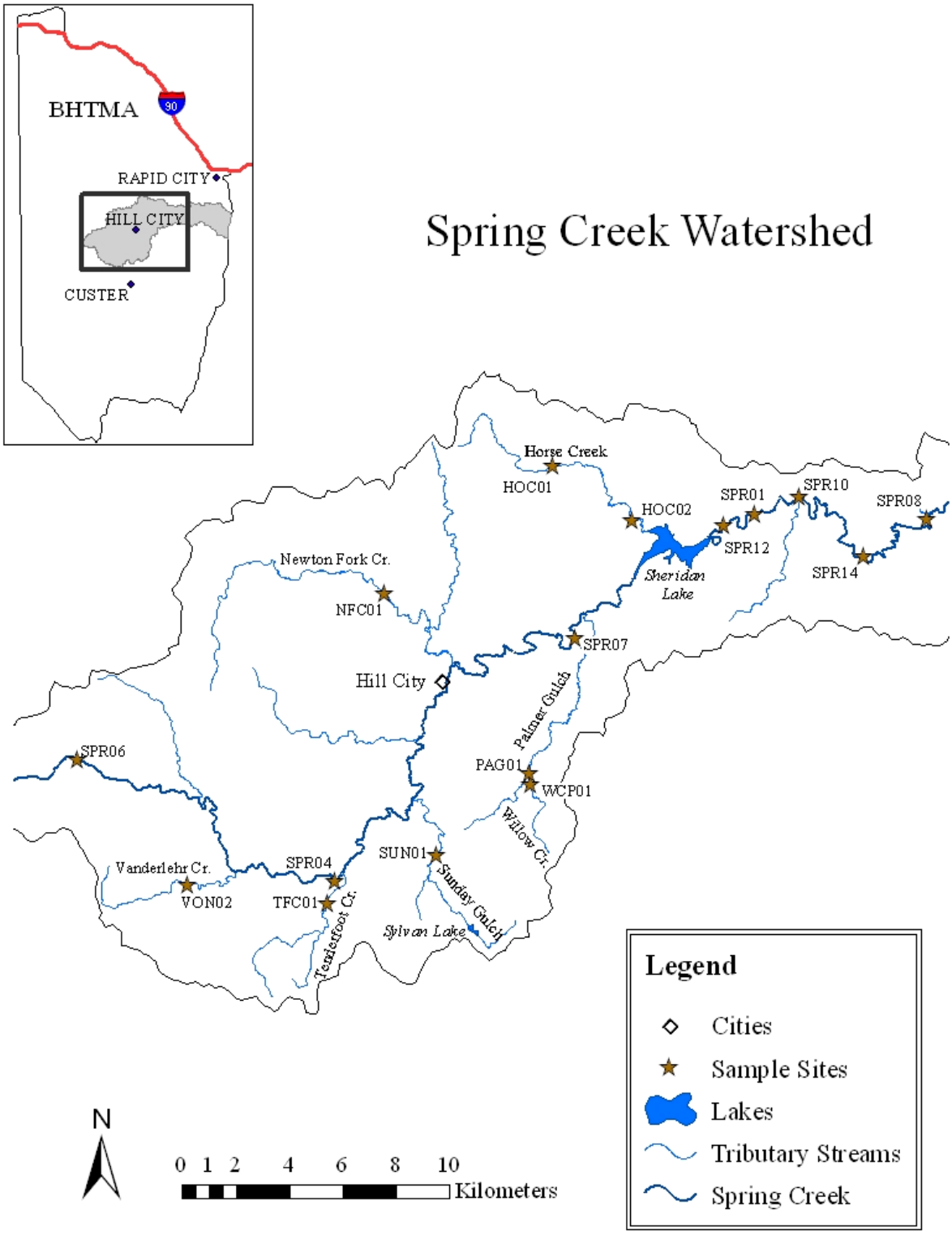

Figure 18: Spring Creek Watershed and 2009 sample sites depicted within the Black Hills Trout Management Area (BHTMA).

Results and Discussion

The Black Hills received above average amounts of spring and summer moisture during 2008 and 2009 (NOAA 2009). Spring Creek's average flow at the USGS gauging station near Keystone for May and June is 53 and 68 respectively, but the monthly average from 2003 to 2008 was never greater than ten CFS. The past two years saw closer to average flows with 35 and 51 CFS for May and June 2008 and 65 and 50 CFS for May and June 2009. This, coupled with the recent prolonged drought (US Drought Monitor), has likely affected stream habitat and fish populations.

Eleven species of fish were captured in the Spring Creek watershed during 2009 sampling (Table 3). The most abundant species in Spring Creek was creek chub followed by white sucker. In the tributaries, the most abundant species was longnose dace followed by brook trout.

Table 3: Abundance and density (per 100 m^2) of species captured within eight sample sites of the Spring Creek Watershed during the 2009 survey.

Species	HOC01	HOC02	PAG01	WCP01	NFC01	SUN01	TFC01	VON02
Brook trout				9 (6.8)	11 (3.7)	(no fish)	(no fish)	3(4.0)
Brown trout								
Rainbow trout					1 (3.4)			
Longnose dace	4 (2.8)	22 (9.2)	1 (0.6)		18 (6.0)			
White sucker			14 (8.2)	4 (3.0)				

Table 4: Abundance and density (per 100 m^2) of species captured within eight sample sites of Spring Creek during the 2009 survey. Sites are listed in order from furthest downstream.

Species	SPR08	SPR14	SPR10	SPR01	SPR12	SPR07	SPR04	SPR06
Brook trout							32 (16.2)	7 (8.7)
Brown trout				2 (0.0)			3 (1.5)	
Rainbow trout	1 (0.0)	1 (.1)			3 (.28)		1 (0.1)	
Longnose dace						101 (20.4)	22 (11.2)	
White sucker	133 (17.8)	30 (3.7)	5 (0.1)	8 (0.1)	30 (2.8)	14 (2.8)		
Creek chub	565 (75.8)	55 (6.9)	34 (4.1)	28 (2.9)	35 (3.3)	69 (13.9)		
Golden shiner					2 (.19)			
Black bullhead		1 (0.1)						
Northern pike		3 (0.4)						
Yellow perch					1 (0.1)			
Rock bass	4 (0.1)	25 (3.1)			1 (0.1)			

Spring Creek (SPR)

During the 2009 survey, eight historically sampled sites on Spring Creek were surveyed during July and August. Overall, sites sampled below Sheridan Lake experienced a decrease in trout abundance and an increase in creek chub and white sucker abundances since their previous surveys. The only exception was site 10 which resulted in a decrease in all species. Decreases in trout abundance are likely a factor of reduced flow and lack of stocking during the prolonged drought as indicated by the reduction in June average flow measured at the USGS gauging station near Keystone (Figure 19; USGS 2009). Brown trout abundances in Spring Creek seemed to be dependant on flow with higher numbers following years of high flow (Figure 20, Figure 22, Figure 23). Creek chub and white sucker abundance, on the other hand, seem to thrive in low flow years, probably due to the decrease in trout abundance (Figure 21). These two species are known to thrive in intermittent streams and during low flow years, surviving in isolated pools where other species would not (Pflieger 1997). Furthermore, despite stockings of trout near sites 1, 10, and 12 in 2008 and 2009 few stocked fish were detected in the 2009 survey (Table 4).

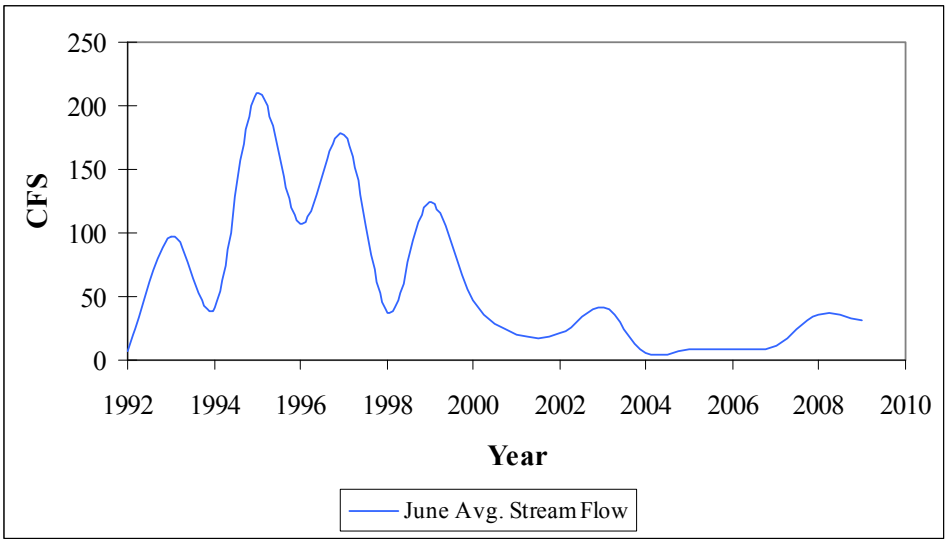

Figure 19: Spring Creek's June average stream flow at the USGS gauging station near Keystone.

The survey of Site 8 on August 3, 2009, in the Stratobowl area (Figure 18), yielded a decrease in trout abundance and a large increase in creek chub and white sucker abundances (Figure 20 and 21). Previous studies were completed in mid to late September and caution should be taken when comparing this data. Longnose dace and rainbow trout have never been abundant during surveys at this site.

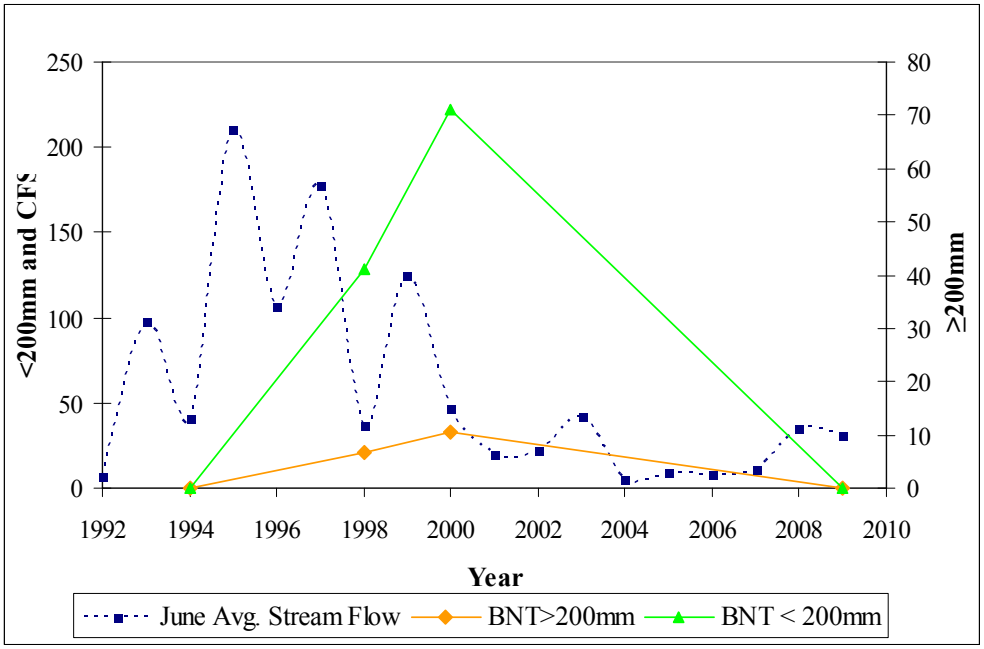

Figure 20: Trends in brown trout (BNT) abundance during surveys of Spring Creek site 8 in 1994, 1998, 2000, and 2009 graphed with June average stream flow.

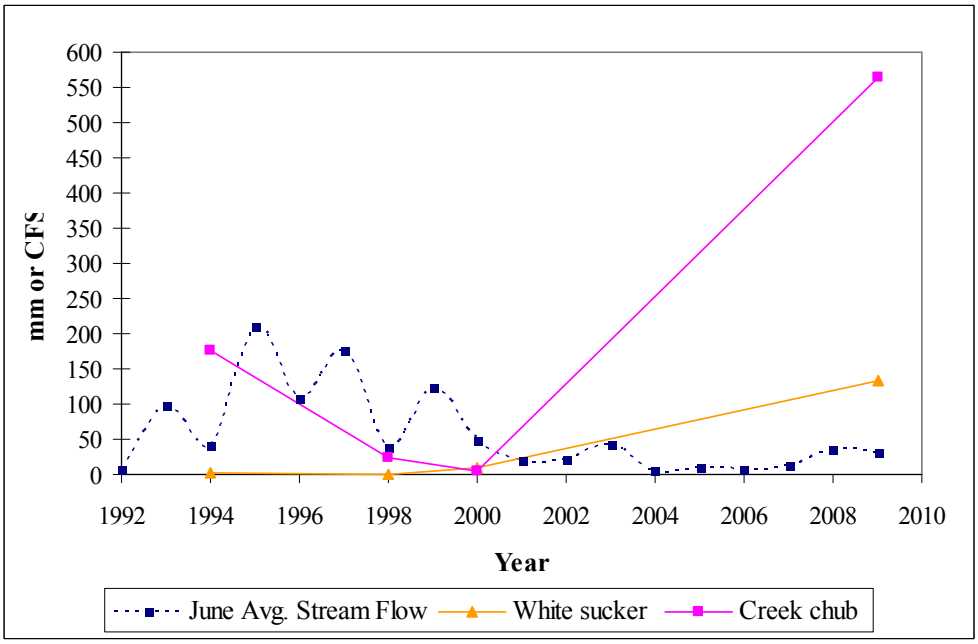

Figure 21: Trends in creek chub and white sucker abundance during surveys of Spring Creek site 8 in 1994, 1998, 2000, and 2009 graphed with June average stream flow.

An August 3, 2009 survey of site 14, at Storm Mountain Camp (Figure 18), detected six species of fish with creek chub as the most abundant, followed by white sucker and rock bass, with 55, 30, and 25 captured respectfully (Table 4). These species increased in abundance from the

previous survey in September 1998 where 38 brown trout, 31 creek chub, 20 rock bass, and five white suckers were captured. Black bullhead, northern pike, and rainbow trout were also detected in the 2009 survey (Table 4).

Creek chub and white sucker were the only species detected at site 10 (Table 3), upstream of Sheridan Lake (Figure 18) during the August 13, 2009 survey. Every previous survey detected brown trout with over 100 captured in September 2000 (Figure 22). Native fish numbers decreased between the 2002 and 2009 survey with 105 creek chubs and 42 white suckers captured in the previous survey versus 34 and 5 captured in 2009 respectively (Table 4).

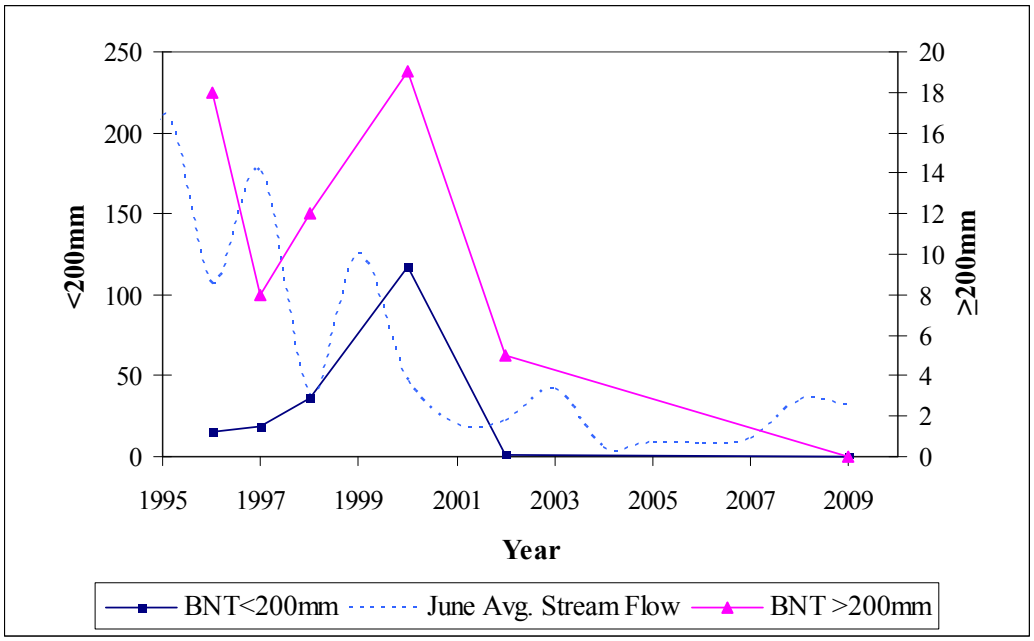

Figure 22: Trends in brown trout abundance at Spring Creek site 10 from 1996 to 2009 graphed with June average stream flow.

Site 1, above Sheridan Lake (Figure 18), was surveyed on August 13, 2009 (Table 4). Trout abundance decreased since a September 2000 sample (Figure 23), while creek chub abundance has increased from zero captured in September 2000 (Table 4). Surveys in 1996 through 2002 were conducted in September and caution should be taken when comparing this data.

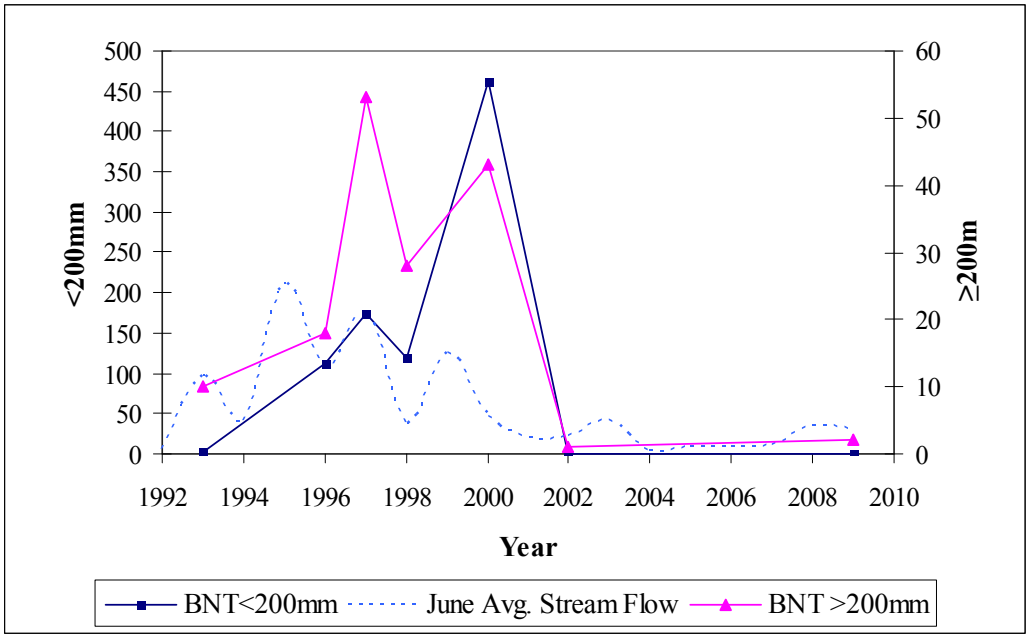

Figure 23: Trends in Brown Trout abundance at Spring Creek site 1 from 1994 to 2009.

Six species of fish were detected on July 24, 2009 at site 12, below Sheridan Lake (Figure 18), with creek chub as the most abundant species followed by white suckers (Table 4). The 2009 survey was the first to detect creek chub. Other species captured in low abundances were rainbow trout, golden shiner, rock bass, and yellow perch (Table 4). Previous surveys detected brown trout and few rainbow trout; however, these fish were possibly the result of stocking.

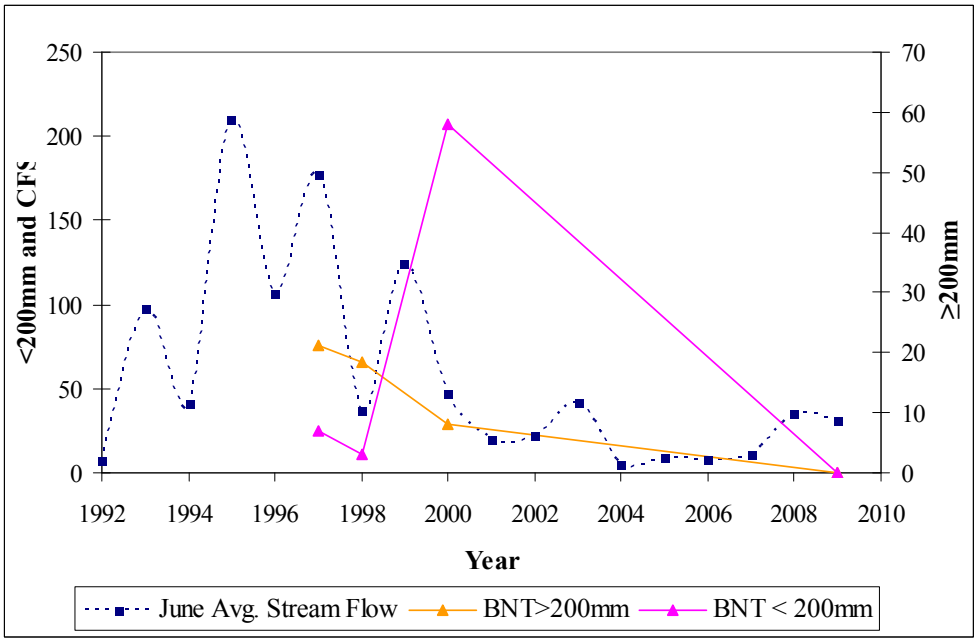

Figure 24: Trends in Brown Trout abundance at Spring Creek site 12 from 1997 to 2009 graphed with June average stream flow.

At the survey of site 7 on July 23, 2009, upstream from Sheridan Lake (Figure 18), only native fish species were detected (Table 4). Compared to the September 2, 1993 survey, creek chub numbers increased from nine to 69, and longnose dace and white sucker numbers have both decreased from 174 to 101 and from 106 to 14 respectively. Caution should be taken when comparing these two surveys due to sample date. Mountain suckers and hatchery brown trout were also detected in 1993, but were absent in the 2009 survey.

Spring Creek site 4, below Hill City (Figure 18), experienced an increase in brook trout and longnose dace numbers between the 1993 and 2009 surveys. Brown trout numbers remained relatively similar (Table 5).

Table 5. Abundance of fish per 100 meters of stream sampled in Spring Creek site 4 on July 23, 2009 compared to historical data.

Species	Sample Date	Number of fish/100m (one pass)
Brook trout <200 mm	July 2009	31
	June 1993	10
Brook trout ≥200 mm	July 2009	1
	June 1993	1
Brown trout ≥200 mm	July 2009	3
	June 1993	4
Rainbow trout ≥200 mm	July 2009	1
	June 1993	0
Longnose dace	July 2009	22
	June 1993	7

Brook trout were the only species detected at site 6, near the headwaters. The 2006 survey was similar, but there were fewer detected than in the 1993 survey (Table 6).

Table 6. Abundance of fish per 100 meters of stream sampled in Spring Creek site 6 on July 27, 2009 compared to historical data.

Species	Sample Date	Number of fish/ 100m (one pass)
Brook trout <200 mm	July 27, 2009	7
	July 13, 2006	8
	June 15, 1993	22
Brook trout ≥200 mm	July 27, 2009	0
	July 13, 2006	0
	June 15, 1993	1

Horse Creek (HOC)

In Horse Creek (Figure 18) the only species of fish detected in the May 13, 2009 sample were longnose dace (Table 3). Site 1 detected lower numbers of fish than the June 1994 sample which detected 21 longnose dace and one brook trout in a single pass. Similarly, a June 1998 survey of site 2 yielded greater abundances of brook trout and dace than the 2009 survey with 25 and 45 captured respectively. Four juvenile (<200 mm TL) rainbow trout, twelve mountain suckers, and two fathead minnows were also captured in site 2 during the 1998 survey.

Palmer Gulch (PAG)

Palmer Gulch site 1, at Willow Creek Horse Camp, (Figure 18) was sampled on May 13, 2009 with 14 white suckers and 1 longnose dace captured (Table 3). Site 1 has been sampled twice previously with a comparable sample in June 1994. That survey detected higher abundances of fish with 18 brook trout, four over 200 mm, 45 longnose dace, and eight white suckers.

Willow Creek (WCP)

Willow Creek, a tributary of Palmer Gulch (Figure 18), was surveyed for the first time at Willow Creek Horse Camp on June 11, 2009. This survey detected nine brook trout less than 200 mm and four white suckers (Table 3).

Newton Fork Creek (NFC)

Newton Fork Creek's May 20, 2009 sample at site 1, below Newton Lake (Figure 18), yielded less trout than a previous survey in 1994. Nine brook trout under 200 mm and two over 200 mm, one rainbow trout over 200mm, and 18 longnose dace were captured (Table 3). A 1994 survey yielded 119 brook trout over 200mm, four over 200 mm, 11 hatchery rainbow trout over 200 mm, and nine longnose dace.

Sunday Gulch (SUN)

A May 13, 2009 survey of Sunday Gulch (Figure 18) yielded no fish. Comparably, a June 2004 survey of this site yielded 163 brook trout and three longnose dace and a June 1993 survey yielded 20 brook trout, 13 white suckers, and 11 longnose dace.

Tenderfoot Creek (TFC)

No fish were detected at site 1 of Tenderfoot Creek (Figure 18) on May 15, 2009. A June 1993 survey detected 13 brook trout all under 200 mm.

Vonderlehr Creek (VON)

Three brook trout were sampled at a new site, 2 (Figure 18), of Vonderlehr Creek on June 5, 2009.

Recommendations

1. Manage Spring Creek as a put-and-take rainbow trout fishery and monitor on a 3-5 year basis.
2. Perform an intensive survey on the main stem of Spring Creek within three years.
3. Manage Spring Creek Watershed's tributaries as a native fishery and monitor on a 5-10 year basis.

Battle Creek Watershed

Counties: Pennington

Fish populations in the Battle Creek Watershed within the Black Hills Trout Management Area (BHTMA) (Figure 1) were surveyed during May through August 2009 to monitor fish populations. The Battle Creek Watershed lies between the Spring Creek and French Creek Watersheds with the headwaters of Battle Creek west of Keystone (Figure 25). The creek runs east through the BHTMA until passing through the south end of Hermosa. The Battle Creek Watershed within the BHTMA is in a pine/spruce forest and managed by the US Forest Service except the southern tributaries which lie in Custer State Park. As with the rest of the Black Hills, many forest service roads cut through the watershed with a few houses and ranches present. The main stem of Battle Creek was last stocked with trout in 2004. Sections of Grace Coolidge Creek as well as Lakota Lake, Horsethief Lake, Center Lake, and Legion Lake are all currently stocked with catchable rainbow trout. Center Lake was also stocked with fingerling tiger trout in 2008 and 2009. Battle Creek and its tributaries are managed under standard regulations with a daily limit of five trout (in any combination) with one allowed 14 inches or longer.

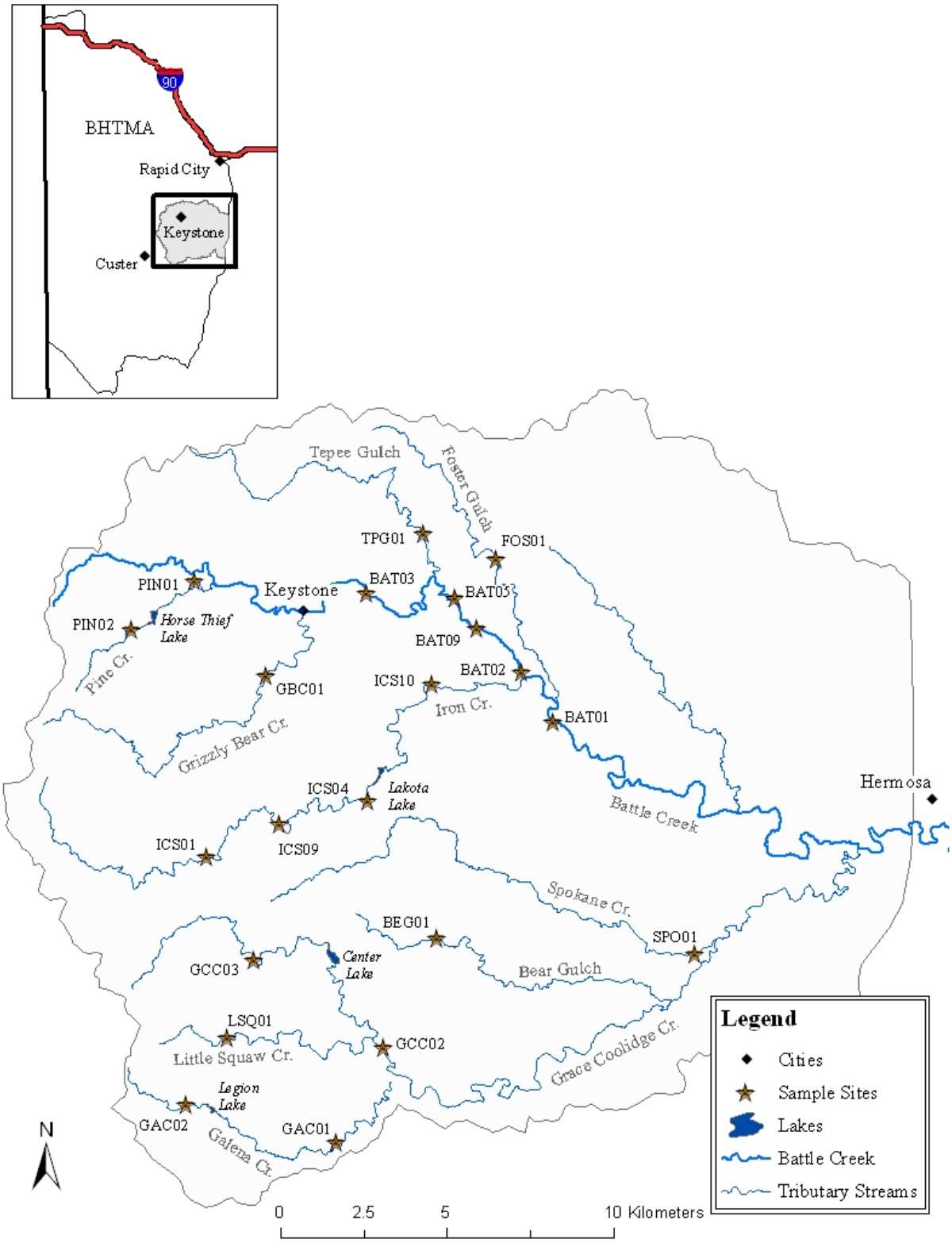

Figure 25: Battle Creek Watershed and 2009 sample sites depicted within the Black Hills Trout Management Area (BHTMA).

Sample Locations

Five reaches in Battle Creek, four reaches in Iron Creek, two reaches in Grace Coolidge, Galena, and Pine Creeks, and one reach in each of Spokane Creek, Bear Gulch, Little Squaw Creek, Foster Gulch, Teepee Gulch, and Grizzly Bear Creek (Figure 25) were surveyed May through August 2009.

Results and Discussion

The Black Hills received above average amounts of spring and summer moisture during 2008 and 2009 (NOAA 2009). Battle Creek's average flow at the USGS gauging station near Keystone (Figure 26) is 32.5 CFS but the monthly average from 2002 to 2008 was never greater than eight CFS. The past two years saw closer to average flows with 43 and 25 CFS for May and June 2008 and 24 and 23 CFS for May and June 2009. This, coupled with the recent prolonged drought, has likely affected stream habitat and fish populations.

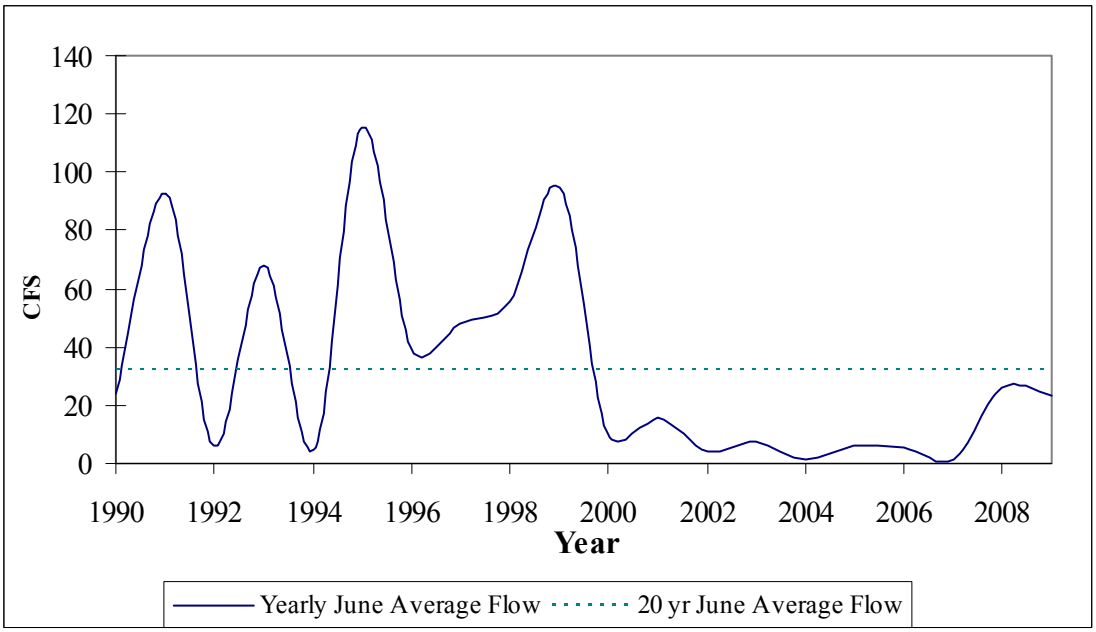

Figure 26: Battle Creek's June average stream flow and 20 year June average at the USGS gauging station near Keystone.

Eleven species of fish were captured in the Battle Creek watershed during 2009 sampling (Table 7). The most abundant species in Battle Creek was creek chub with few trout detected. In the tributaries, the most abundant species were longnose dace and creek chub.

Table 7: Abundance and density (per 100 m^2) of species captured within 21 sample sites of the Battle Creek watershed during the 2009 survey. Sites are listed in order from furthest downstream to upstream.

Species	BKT	BNT	RBT	LND	WHS	MTS	CRC	ROB	FHM
BAT01		3(.63)		1 (.21)	23 (4.83)		52 (10.92)	2 (.42)	
BAT02				12 (1.82)	51 (7.75)		107(16.26)		2 (.30)
BAT09				29 (3.42)	151(17.82)	2(.24)	481(56.77)	4 (.47)	85(10.03)
BAT05		1(.17)		68(11.87)	49 (8.56)		194(33.87)		34 (5.94)
BAT03	2(.32)				7 (1.14)				
GCC02	16(3.17)			93(18.40)	20 (3.96)		65 (12.86)		
GCC03	19(5.57)		5(1.47)						
SPO01	(no fish)								
BEG01	25(19.10)								
GAC01	8(3.08)						9 (3.46)		
GAC02	(no fish)								
LSQ01	(no fish)								
FOS01	(no fish)								
ICS10				15 (4.18)	37 (10.30)		200(55.70)		
ICS04	15 (4.16)			53(14.69)					
ICS09	61 (17.25)			57(16.12)					
ICS01	56(19.31)								
TPG01	(no fish)								
GBC01	6 (1.37)			16 (3.64)			6 (1.37)		
PIN01	(no fish)								
PIN02	(no fish)								

BattleCreek (BAT)

During the 2009 survey, four historically sampled sites and one new site on Battle Creek were surveyed during July and August. In the survey of Battle Creek site 1 (Figure 25) on June 26, 2009 creek chub were the most abundant species followed by white sucker with 52 and 23 sampled, respectively. Three brown trout were detected with one over 200 mm. One longnose dace and two rock bass were also sampled. Diversity and abundance have decreased since this site was last sampled in June 1994 with the following detected: two brook trout, 125 brown trout, 14 rainbow trout, seven unidentified young-of-the-year trout, three fathead minnows, 66 longnose dace, nine mountain suckers, and 37 white suckers.

Only native fish species were detected at site 2 of Battle Creek (Figure 25) on June 12, 2009. Creek chub were the most abundant with 107 sampled. Fifty-one white suckers, 12 longnose

dace, and two fathead minnows were also sampled. During the previous survey of this site the following were detected: one unidentified age-0 trout, 10 creek chubs, three fathead minnows, 17 longnose dace, and 34 white suckers.

Site 9 of Battle Creek (Figure 25) was sampled on July 9, 2009. The survey detected two mountain suckers, 481 creek chubs, 85 fat head minnows, 29 longnose dace, four rock bass, and 151 white suckers.

Battle Creek site 5 located upstream of site 9 (Figure 25), was surveyed on June 24, 2009. The survey detected one brown trout under 200 mm, 194 creek chubs, 34 fathead minnows, 68 longnose dace, and 49 white suckers.

Site 3 of Battle Creek (Figure 25) is a previously sampled site and was surveyed on June 25, 2009. This survey yielded two brook trout less than 200 mm and seven white suckers. A greater abundance and diversity of fish were detected during the survey in June of 1994 with the following detected: six brown trout over and eight under 200 mm, four brook trout over and eight under 200mm, 339 longnose dace, 56 white suckers, six creek chub, and one mountain sucker.

Grace Coolidge Creek (GCC)

Grace Coolidge Creek was sampled at site 2 (Figure 25) on May 19, 2009. During this survey 16 brook trout were captured with five over 200mm, as well as 65 creek chubs, 93 longnose dace, and 20 white suckers. A previous survey in June 1994 yielded 52 brook trout with seven over 200 mm, 37 creek chubs, 292 longnose dace, and 32 white suckers.

At a survey of site 3 (Figure 25) on May 20, 2009 the following were captured: 19 brook trout under 200 mm, and five rainbow trout four of which were over 200 mm. In a previous survey a greater abundance was captured with 104 brook trout, three rainbow trout, and 46 unidentified age-0 trout.

Spokane Creek (SPO)

No fish were captured at site 2 of Spokane Creek (Figure 25) on May 12, 2009 or in June 1994.

Bear Gulch (BEG)

The survey of Bear Gulch site 1 (Figure 25) on May 19, 2009 yielded 24 brook trout under 200 mm and 1 over 200 mm. Ninety brook trout, all under 200 mm, were detected in the previous survey in June 1994.

Galena Creek (GAC)

Galena Creek sites 1 and 2 (Figure 25) were sampled on May 20, 2009. Site 1 yielded nine creek chubs, seven brook trout under 200 mm and one brook trout over 200 mm. A June 1994 survey of site 1 yielded 75 brook trout under 200 mm, six creek chubs, and 50 longnose dace. Site 2 yielded no fish in 2009. In 1994, 45 brook trout under and seven over 200 mm were detected along with 37 creek chub, 32 white suckers, and 292 longnose dace.

Little Squaw Creek (LSQ)

The May 19, 2009 and the June 1994 surveys of Little Squaw Creek site 1 (Figure 25) both yielded no fish.

Foster Gulch (FOS)

No fish were detected during the May 14, 2009 or the July 1994 surveys of Foster Gulch site 1 (Figure 25).

Iron Creek South (ICS)

On May 18, 2009 site 10 (Figure 25) of Iron Creek was sampled and yielded 200 creek chubs, 15 longnose dace, and 37 white suckers.

Site 4 (Figure 25) was sampled on May 18, 2009 with 53 longnose dace, 13 brook trout under 200mm, and two brook trout over 200 mm detected. The previous survey on July 1993 yielded 62 brook trout under 200mm, six rainbow trout under 200mm, 16 rainbow trout over 200 mm, 17 longnose dace, and 15 age-0 trout.

The survey of site 9 (Figure 25) on Iron Creek was completed in May 19, 2009. Brook trout and longnose dace were the only species detected with 61 and 57 captured respectively. This is a decrease in abundance from the June 1992 survey which detected 16 brown trout and one brook trout over 200mm, four brown trout and 141 brook trout under 200mm, three rainbow trout, and, and 18 longnose dace.

Only brook trout were detected at Iron Creek site 1 (Figure 25), surveyed on May 19, 2009. This site has been sampled three previous times and as compared to those surveys, abundance has decreased for brook trout (Table 8).

Table 8: Abundance of fish per 100 meters of stream sampled in Iron Creek site 1 during four surveys.

Species	Sample Date	Number of fish/100m (one pass)
Brook trout <200 mm	May 19, 2009	54
	July 20, 1994	204
	July 7, 1993	58
	July, 6, 1992	102
Unidentified Y.O.Y. trout	July 7, 1993	25
Brown trout >200mm	July, 6, 1992	2

Teepee Gulch (TPG)

Teepee Gulch site 1 (Figure 25) was sampled on May 14, 2009 with no fish captured. This site was surveyed in June 1994 where 104 brook trout were sampled, seven of which were over 200mm.

Grizzly Bear Creek (GBC)

Site 1 of Grizzly Bear Creek (Figure 25) was sampled on May 19, 2009 with six brook trout under 200mm, six creek chub, and 16 longnose dace captured. The survey in June 1994 yielded 121 brook trout, five brown trout over 200 mm, 11 unidentified age-0. trout, three creek chub, 17 longnose dace, and two white suckers.

Pine Creek (PIN)

Two sites were surveyed in Pine Creek (Figure 25) during the 2009 survey. Site 1, sampled on May 18, 2009 and site 2, sampled on May 14, 2009 both yielded no fish. Similar results occurred during the survey of site 2 in July 1994; however, the previous survey of site 1 yielded 40 brook trout, 30 unidentified age-0 trout, and six fathead minnows.

Recommendations

1. Manage Battle Creek Watershed's tributaries as a natural brook trout and native fishery and monitor on a 5-10 year basis.
2. Perform an intensive survey on the main stem of Battle Creek within five years.

French Creek Watershed

Counties: Custer

Fish populations in the French Creek Watershed within the Black Hills Trout Management Area (BHTMA) (Figure 1) were surveyed during 2009 to monitor fish populations. The French Creek Watershed lies south of the Battle Creek Watershed and includes part of Custer State Park (CSP). The headwaters of French Creek lie about seven miles west of the city of Custer and the creek flows southeast through Custer State Park. It crosses Hwy 79 near Fairburn and drains into the Cheyenne River about 14 miles east near Red Shirt. The French Creek Watershed within the BHTMA is in a pine/spruce forest managed by the US Forest Service and the State of South Dakota. As with the rest of the Black Hills, many forest service roads cut through the watershed with a few houses and ranches present. French Creek is stocked with catchable rainbow trout from just downstream of Stockade Lake to Horse Camp in CSP. Stockade Lake, Bismark Lake, and Custer Municipal Pond are also stocked with catchable trout. French Creek and its tributaries are managed under standard BHTMA regulations with a daily limit of five trout (in any combination) with one allowed 14 inches or longer.

Sample Locations

Eight reaches in French Creek, and one reach in each of Meeker East, Meeker West, Ruby, and South Fork French Creeks (Figure 27) were surveyed May through August 2009.

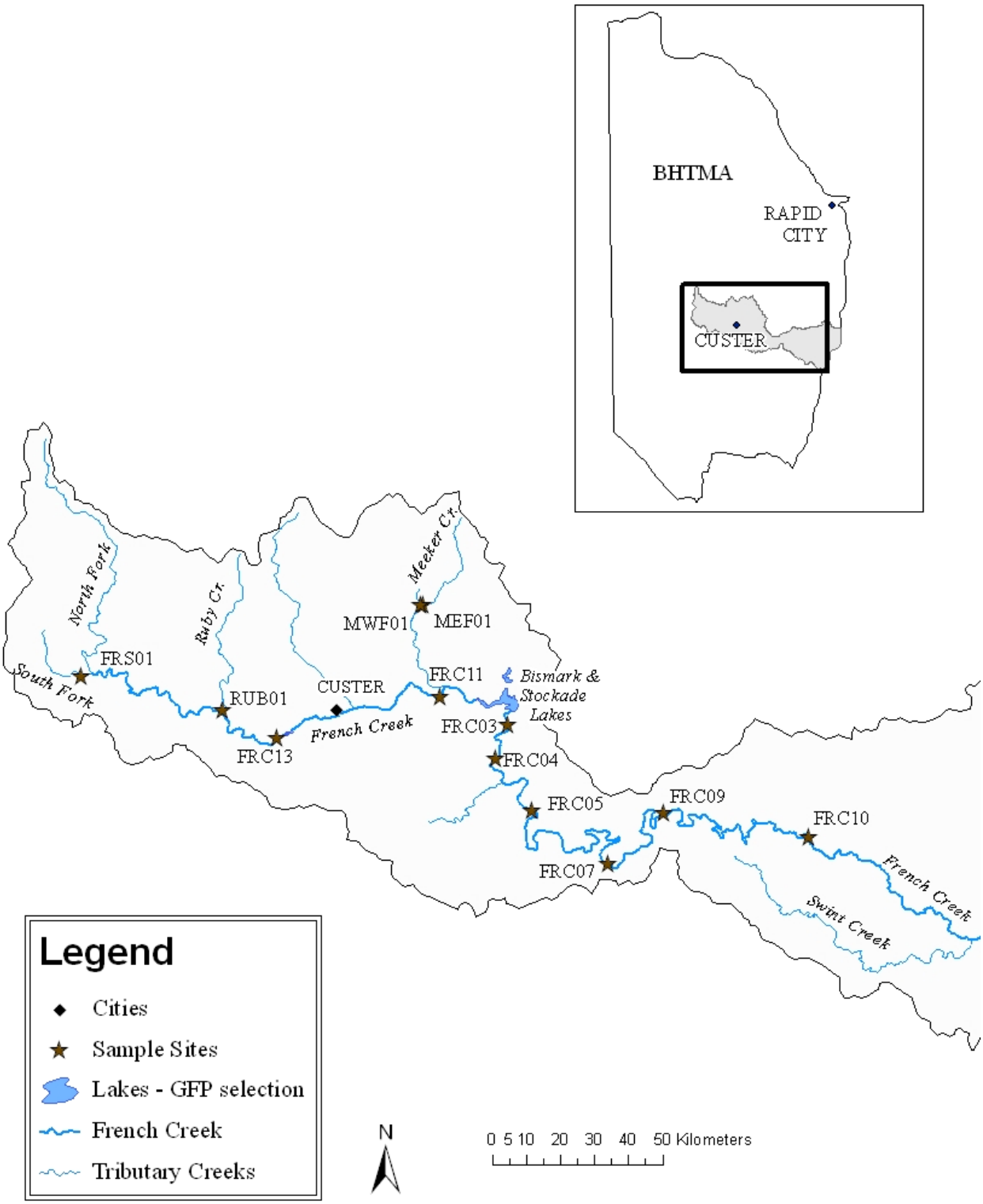

Figure 27: French Creek Watershed and 2009 sample sites depicted within the Black Hills Trout Management Area (BHTMA).

Results and Discussion

The Black Hills received above average amounts of spring and summer moisture during 2008 and 2009 (NOAA 2009). French Creek's average flow at the USGS gauging station near Fairburn for May and June is 24 and 25 respectively, but the monthly average from 2004 to 2007 was never greater than five CFS. The past two years saw closer to average flows with 23 and 26 CFS for May and June 2008 and 18 and 16 CFS for May and June 2009. This, coupled with the recent prolonged drought, has likely affected stream habitat and fish populations.

Eleven species of fish were captured in the French Creek watershed during 2009 sampling (Table 9). The most abundant species in French Creek was creek chub followed by longnose dace. In the tributaries the most abundant species was brook stickleback.

Table 9: Abundance and density (per100 m^2) of species captured within 21 sample sites of the French Creek watershed during the 2009 survey. Sites are listed in order from downstream to upstream.

Species	BKT	BNT	RBT	LND	WHS	CRC	SMB	FHM	BRS	YEP	NOP	GSF
FRC10	14 (1.32)		1 (0.1)		2 (.19)		1 (0.1)					
FRC09		1 (.14)		31 (4.4)	61 (8.6)	167 (23.4)	1 (.1)					
FRC07	1 (.13)			112 (14.9)	57 (7.6)	215 (28.6)		57 (7.6)				
FRC05		3 (.55)		333 (61.6)	36 (6.7)	160 (29.6)		3 (.6)				
FRC04					21 (4.4)	139 (29.2)						
FRC03					47 (7.4)	67 (10.6)		5 (.8)	13 (2.1)	1 (.2)	3 (.5)	
FRC11					8 (2.4)	30 (9.1)		6 (1.8)	6 (1.8)			
FRC13					11 (4.3)	3 (1.2)		6 (2.3)	6 (2.3)			
MEF01						1 (1.2)			15 (18.1)			
MWF01						2 (2.8)			3 (4.2)			
RUB01					28 (14.1)	47 (23.7)			60 (30.3)			2 (1.0)
FRS01	(no fish)											

French Creek (FRC)

During the 2009 survey, eight historically sampled sites on French Creek were surveyed. Site 10, near French Creek East Primitive Campground in CSP (Figure 27), was sampled on May, 28,

2009 and it was the only site sampled in this watershed with considerable numbers of trout captured with 14 (1.32/100m^2) brook trout captured (Table 9). It was also the only site that didn't have creek chub present. Two white suckers and one each rainbow trout and small mouth bass were also captured during the sample. A previous survey in September 1993 resulted in greater abundance and density than the 2009 survey with 147 brown trout over 200mm, 27 brown trout under 200mm, nine rainbow trout under 200mm, 19 creek chub, 53 longnose dace, six white suckers, and seven black crappie. This data; however, should be examined with caution since these two surveys occurred in September.

Site 9, near the West Primitive Campground (Figure 27), was sampled on June 8, 2009 with creek chubs as the most abundance species (Table 9). Longnose dace and white suckers were detected with 31 and 61, respectively, as well as one each brown trout and smallmouth bass. During a previous survey in September 1993 the following were captured: nine brown trout with two just under 200mm, 14 creek chub, 176 longnose dace, 18 mountain suckers, and 47 white suckers.

At site 7, near the horse camp on the west side of CSP (Figure 27), similar species were captured as other French Creek sites. One brown trout, 215 creek chub, 57 white suckers, 57 fathead minnows, and 112 longnose dace were detected (Table 9). During the survey of this site in July 1994, 18 brown trout were captured with two less than 200mm. Also detected were 77 white suckers, 80 longnose dace, 17 mountain suckers, one black crappie, and one black bullhead.

French Creek site 5 (Figure 27), had the greatest number of longnose dace when it was sampled on June 3, 2009. It was the only site in the watershed where creek chub were not the most abundant species detected. Fewer trout were captured in 2009 as compared to other years, but a greater abundance of native fish was detected (Table 10).

Table 10: Abundance of fish per 100 meters of stream sampled in French Creek site 5 during four surveys.

Species	Sample Date	Number of fish/100m (one pass)
Brown trout <200 mm	June 3, 2009	2
	Sept. 8, 1993	5
	May 5, 1992	0
Brown trout >200 mm	June 3, 2009	1
	Sept. 8, 1993	7
	May 5, 1992	24
Rainbow trout >200 mm	May 5, 1992	1
Longnose dace	June 3, 2009	333
	Sept. 8, 1993	63
	May 5, 1992	7
Creek chub	June 3, 2009	160
	Sept. 8, 1993	49
	May 5, 1992	19
White sucker	June 3, 2009	36
	Sept. 8, 1993	25
	May 5, 1992	64
Mountain sucker	June 3, 2009	0
	Sept. 8, 1993	1
	May 5, 1992	7

A June 3, 2009 survey of French Creek site 4 (Figure 27) yielded 139 creek chubs, 21 white suckers, and three fathead minnows (Table 9). A May 1992 survey resulted in 19 brown trout over 200 mm, one rainbow trout under 200 mm, 33 creek chub, 49 white suckers, and four fathead minnows.

French Creek site 3, below Stockade Lake (Figure 27), was surveyed on June 15, 2009 with the greatest number of species sampled in the watershed. Six species were captured including three northern pike, 67 creek chubs, 47 white suckers, 13 brook stickleback, one yellow perch, and five fathead minnows (Table 9). The 2009 survey varied in species composition from the previous survey in May 1992. That survey yielded 37 brown trout with all but one over 200 mm, 38 rainbow trout with three less than 200 mm, 215 white suckers, 88 creek chubs, 19 fathead minnows, 16 black bullheads, one largemouth bass, and one golden shiner.

Site 11 of French Creek, east of Custer (Figure 27), was surveyed on June 26, 2009. This survey yielded 30 creek chub, eight white suckers, six fathead minnows, and six brook sticklebacks (Table 9). A previous survey in July 1994 yielded 64 rainbow trout <200 mm, 12 rainbow trout over 200 mm, 88 creek chubs, and one smallmouth bass.

On June 26, 2009 site 13 (Figure 27) was surveyed upstream of Custer Municipal Pond. During the survey 11 white suckers, six creek chubs, six fathead minnows, and three creek chub were captured (Table 9). The survey in July 1996 resulted in 305 creek chubs, six rainbow trout over 200 mm, and seven white suckers.

Meeker Creek East Fork (MEF)

Site 1 on Meeker East Creek (Figure 27) was sampled on May 21, 2009 and resulted in 15 brook stickle back and one creek chub (Table 9). The survey in May 1994 resulted in 43 creek chubs.

Meeker Creek West Fork (MWF)

Meeker West Fork (Figure 27) was also sampled on May 21. Two creek chub and three brook stickleback were captured (Table 9). In May 1994, 143 creek chub were captured.

Ruby Creek (RUB)

Ruby Creek (Figure 27) was sampled for the first time on May 21, 2009. During this survey 47 creek chubs, 28 white suckers, 60 brook stickleback, and two green sunfish were detected (Table 9).

French Creek South Fork (FRS)

On June 2, 2009 South Fork French Creek (Figure 27) was surveyed with no fish captured (Table 9); however overgrown bushes made sampling the site difficult and some fish may have escaped capture. The same results occurred during a June 2004 survey.

French Creek North Fork (FRS)

North Fork French Creek was not sampled in 2009 due to low water visibility.

Recommendations

1. Manage French Creek Watershed's tributaries as a natural brook trout and native fishery and monitor on a 5-10 year basis.
2. Perform an intensive survey on the main stem of French Creek within five years.

Southern Hills Minor Watersheds:
Lame Johnny Creek, Beaver Creek, Pass Creek, Red Canyon Creek, Fall River

Counties: Custer, Fall River

Fish populations in the Lame Johnny Creek, Beaver Creek, Pass Creek, Red Canyon Creek, and Fall River Watersheds within the Black Hills Trout Management Area (BHTMA) (Figure 1) were surveyed during May through August 2009 to monitor fish populations. These watersheds were combined because they have fewer flowing streams thus fewer sites were sampled. The creeks within these watersheds are managed under standard fishing regulations with a daily limit of five trout (in any combination) with one allowed 14 inches or longer. These watersheds within the BHTMA are in a pine/spruce forest. A large portion of them, especially the southern end of the Red Canyon and Pass Creek Watersheds, lie on private property.

Most of the Lame Johnny Watershed lies in Custer State Park with the headwaters of Flynn Creek roughly 9 km (5.5 mi) south of Custer. Flynn Creek converges into South Fork Lame Johnny Creek which joins North Lame Johnny Creek to make Lame Johnny Creek near the southeast end of Custer State Park. Lame Johnny Creek continues southeast until it enters the Cheyenne River about 17 km (10.6 mi) east of Buffalo Gap.

The Beaver Creek headwaters lie approximately 4 km (2.5 mi) south of Custer. The creek runs southwest through Wind Cave NP and enters the Cheyenne River about 8 km (5 mi) southeast of Buffalo Gap. The northwestern two-thirds of the Beaver Creek Watershed are in a pine/spruce forest managed by the US Forest Service and the National Park Service. Southeastern portions of this watershed within the BHTMA lie primarily on private ranch land in a short to mid-grass prairie with almost no public access.

Hell Canyon's headwaters are approximately 16 km (9.9 mi) southwest of Hill City. The canyon runs south and enters Beaver Creek (different water than noted above) before entering the Cheyenne River 19 km (11.8mi) northwest of Edgemont.

The headwaters of Pleasant Valley Creek lie approximately 14 km (8 mi) west of Custer. Pleasant Valley Creek runs south entering Red Canyon which enters the Cheyenne River about 4 km (2.5mi) northeast of Edgemont.

The headwaters of Cold Brook Creek lie approximately 9 km (5.6 mi) north-northwest of Pringle. Cold Brook and Hot Brook Creeks converge on Fall River just north of Hot Springs. Fall River enters the Cheyenne River downstream of Angostura Reservoir about 8.5 km (5.2 mi) south of Hot Springs.

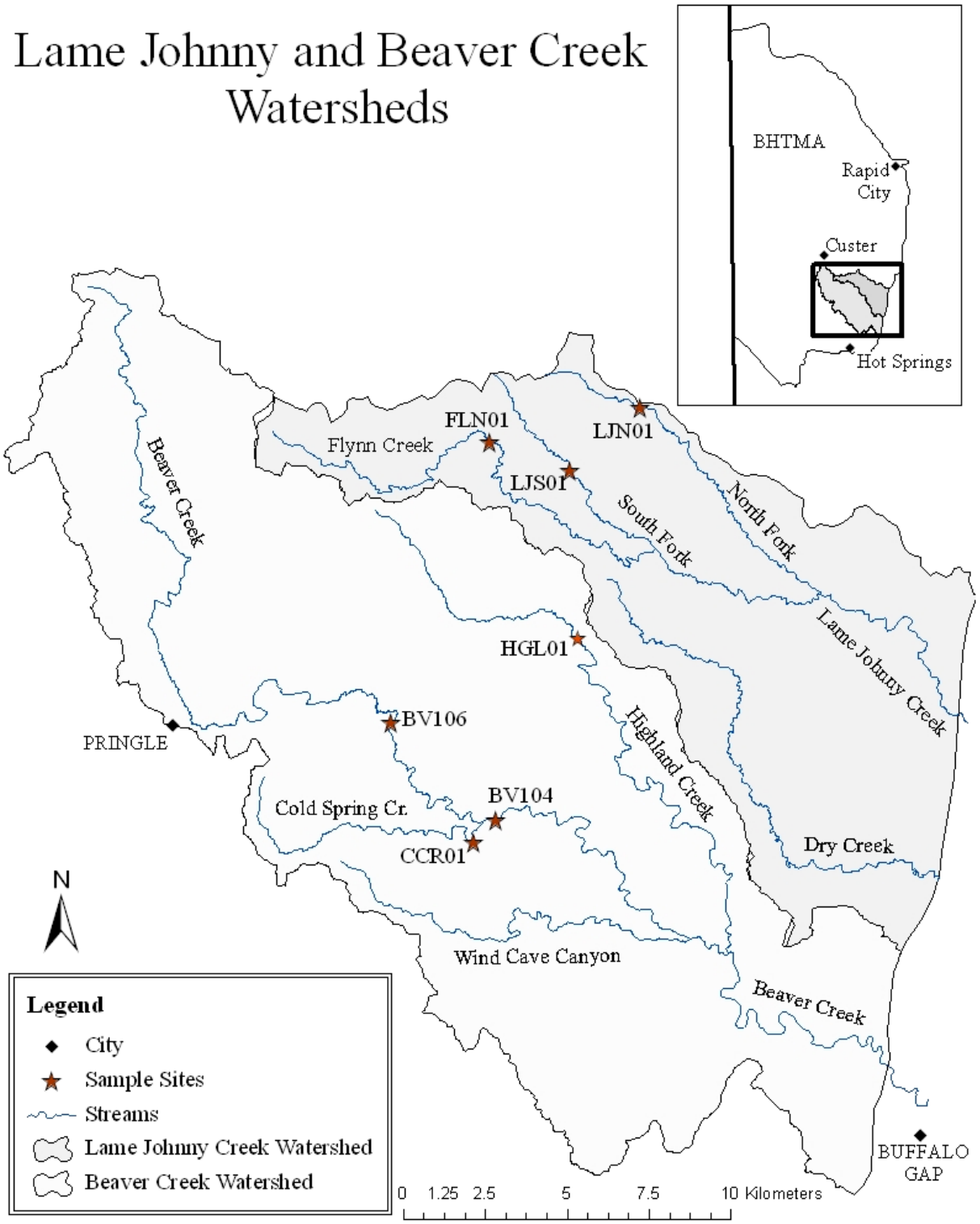

Figure 28: Lame Johnny and Beaver Creek Watersheds in the Black Hills Trout Management Area (BHTMA) with 2008 and 2009 sample sites depicted.

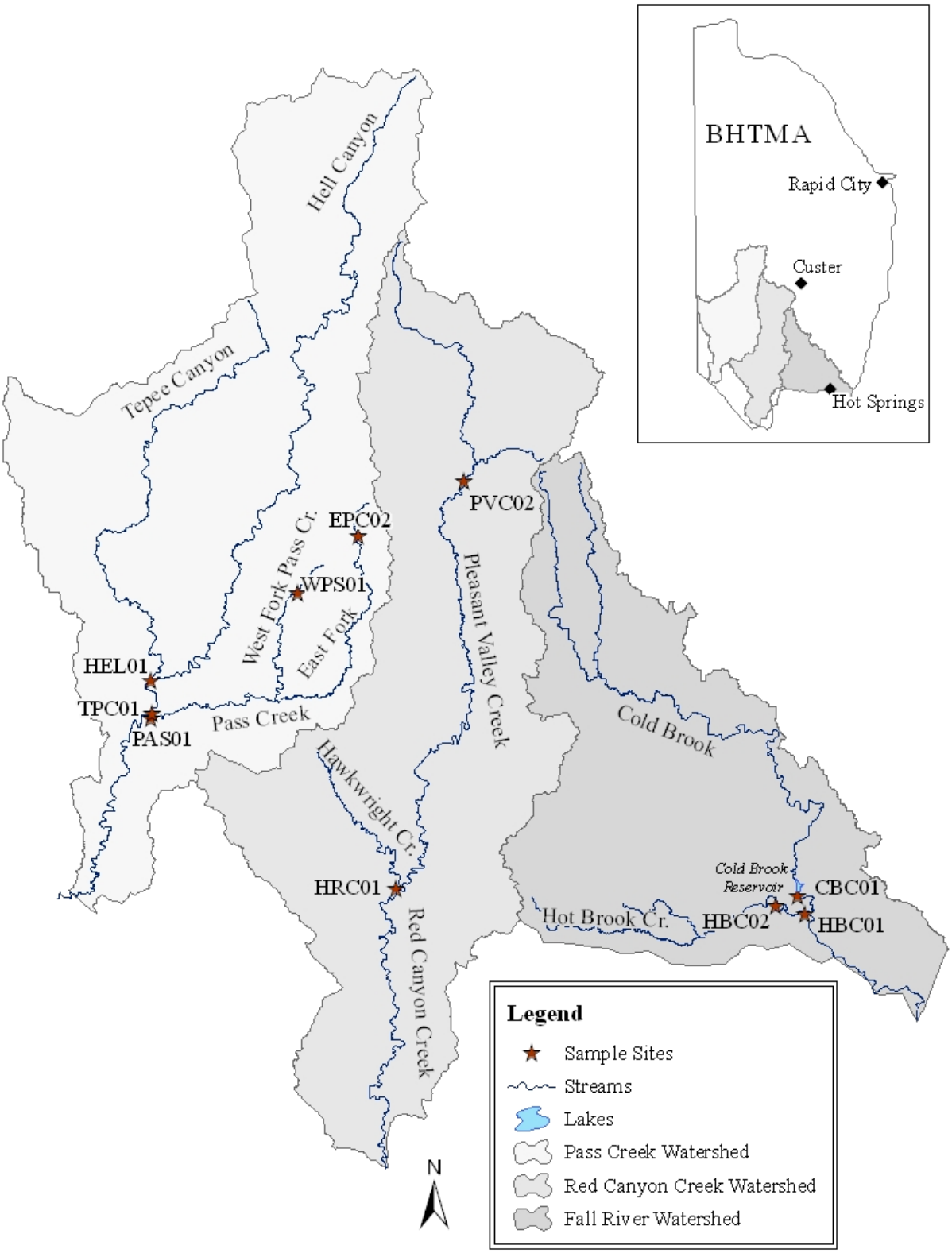

Figure 29: Pass Creek, Red Canyon Creek, and Fall River Watersheds in the Black Hills Trout Management Area (BHTMA) with 2009 sample sites depicted.

Results and Discussion

The Black Hills received above average amounts of spring and summer moisture during 2008 and 2009 (NOAA 2009). No USGS flow data is available for the southern Black Hills minor watersheds except for Beaver Creek near Pringle which has not seen a monthly mean over one CFS since May 2003 (USGS 2009). Consequently, the recent prolonged drought has likely affected stream habitat and fish populations.

Lame Johnny Watershed

Flynn Creek (FLN)

Flynn Creek site 1 (Figure 29) was the only site sampled in the watershed that detected fish. The survey of this site on May 26, 2009 yielded three longnose dace, a reduction in abundance from previous surveys. A previous survey in June 1993 detected one brook trout at 201 mm, 24 longnose dace, 21 mountain suckers, and one fathead minnow.

Lame Johnny Creek-North Fork (LJN)

Site 1 on Lame Johnny Creek North Fork (Figure 29) was not sampled since the water was less than 1 inch deep. This site was dry during a previous survey in September 1994.

Lame Johnny Creek-South Fork (LJS)

No fish were captured at Site 1 (Figure 29) on Lame Johnny Creek South Fork on May 26, 2009. During the survey in September 1994 this site was dry.

Beaver Creek Watershed

Beaver Creek (BV1)

Beaver Creek Site 4, within Wind Cave National Park (Figure 29), was sampled on June 16, 2009 with 56 creek chub and 51 fathead minnows captured. A previous survey of this site in June 1997 yielded a different species composition with three brook trout, 76 longnose dace, and two white suckers.

Highland Creek (HGL) (2008)

Highland Creek site 1 (Figure 29) was sampled on June 10, 2008 with no fish detected. Two surveys were conducted previously in June 1995 and June 2004. The 1995 survey yielded 28 brook trout under and four over 200mm while the 2004 survey yielded four brook trout under and one over 200 mm.

Cold Spring Creek (CCR)

Site 1 of Cold Spring Creek (Figure 29), within Wind Cave NP, was sampled on June 16, 2009 with no fish captured. Water visibility was very low during the sample due to algae growth. A previous survey of this site in June 1997 yielded four brook trout less than and 13 greater than 200 mm, 23 longnose dace, 50 white suckers, 11 fathead minnows, and one mountain sucker.

Fall River Watershed

Hot Brook Creek (HBC)

Two sites were sampled within Hot Brook Creek (Figure 29) on June 27, 2009. Site 1 yielded 11 creek chub, four green sunfish, 72 longnose dace, 19 sand shiners, two plains top-minnows, and five white suckers. In May 1993 a survey was conducted with seven brook trout under 200 mm and eight over 200 mm captured along with two green sunfish and one white sucker.

Site 2 yielded one creek chub, one fathead minnow, 19 green sunfish, 95 longnose dace, and six plains top minnows. During a previous survey in May 1993 the following were captured: one brown trout, two black bullhead, 33 green sunfish, six longnose dace, and three plains top minnows.

Cold Brook Creek (CBC)

Cold Brook Creek site 1 (Figure 29) was dry on June 17, 2009. This is the same results as a June 1995 survey.

Red Canyon Watershed

Hawkwright Creek (HRC)

Site 1 of Hawkwright Creek (Figure 29) was dry on April 13, 2009 and during the survey in Aug 1994.

Pleasant Valley Creek (PVC)

A new site, 2 (Figure 29), was created on Pleasant Valley Creek due to the previously sampled site being on private land. No fish were captured during the May 26, 2009 survey.

Pass Creek Watershed

Pass Creek (PAS)

Pass Creek site 1 (Figure 29) was dry on April 13, 2009 and during the survey in Aug 1994.

Tepee Canyon Creek (TPC)

Tepee Canyon Creek sites 1 and 2 (Figure 29) were dry on April 13, 2009 and during the survey in Aug 1994.

Hell Canyon Creek (HEL)

Hell Canyon Creek site 1 (Figure 29) was dry on April 13, 2009 and during the survey in Aug 1994.

West Fork Pass Creek (WPS)

West Fork Pass Creek site 1 (Figure 29) was dry on May 26, 2009 and during the survey in Aug 1994.

East Pass Creek (EPC)

East Fork Pass Creek site 2 (Figure 29) was dry on May 29, 2009 and during the survey in Aug 1994.

Recommendations

1. Manage Lame Johnny Creek, Beaver Creek, Fall River, Red Canyon, Pass Creek Watersheds as a natural brook trout and native fishery.

2. Monitor these watersheds on a seven to ten year basis.

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Appendix

Appendix A. Population and Biomass Estimates for Castle Creek.

Site Number: 11 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 11
Legal Description: S00,R00E,T
Stream Classification: BNT2 RBT2

Date Sampled: 07 JUL 2009
Site Length (m): 100
Mean Width (m): 4.6
Number of Passes: 3

Conductivity (µmhos): 370
pH: 8.6
Water Temperature (°C): 15.5
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brown Trout	<200 mm	36	36	36	38	790	14.40	360	320	12.86	579	98.4	18.2	9.25
Brown Trout	≥200 mm	7	7	7	7	154	23.82	70	62	21.27	113	250.0	155.0	0.93
Brown Trout	ALL	43	43	43	45	944	38.23	430	382	34.13	692	123.1	40.5	7.89
Rainbow Trout	≥200 mm	1	1	1	1	22	6.19	10	9	5.53	16	306.0	282.0	0.98
Rainbow Trout	ALL	1	1	1	1	22	6.19	10	9	5.53	16	306.0	282.0	0.98
White Sucker	ALL	2	2	2	2	44	0.04	20	18	0.04	32	56.0	1.0	0.57

Site Number: 48 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 48
Legal Description: S00,R00E,T
Stream Classification: BKT0 BNT2

Date Sampled: 07 JUL 2009
Site Length (m): 100
Mean Width (m): 5.0
Number of Passes: 3

Conductivity (µmhos): 372
pH: 8.7
Water Temperature (°C): 18.5
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brook Trout	<200 mm	1	1	1	1	20	0.58	10	8	0.52	16	141.0	29.0	1.03
Brook Trout	ALL	1	1	1	1	20	0.58	10	8	0.52	16	141.0	29.0	1.03
Brown Trout	<200 mm	26	26	26	27	523	16.00	260	212	14.29	418	127.8	30.6	3.66
Brown Trout	≥200 mm	11	11	11	13	221	32.38	110	90	28.91	177	238.3	146.4	1.04
Brown Trout	ALL	37	37	37	39	744	49.09	370	301	43.83	595	160.7	66.0	2.86

Population and Biomass Estimates for Castle Creek. (Continued)

Site Number: 79 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 79
Legal Description: S00,R00E,T
Stream Classification: BNT2 RBT1

Date Sampled: 01 JUL 2009
Site Length (m): 100
Mean Width (m): 3.9
Number of Passes: 3

Conductivity (µmhos): 387
pH: 8.5
Water Temperature (°C): 13.9
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brown Trout	<200 mm	36	38	36	43	970	27.26	380	393	24.34	611	123.3	28.1	1.26
Brown Trout	≥200 mm	5	5	5	5	128	13.96	50	52	12.47	80	214.2	109.4	1.07
Brown Trout	ALL	41	43	41	48	1,097	41.73	430	444	37.26	692	134.4	38.0	1.24
Rainbow Trout	<200 mm	1	1	1	1	26	1.45	10	10	1.30	16	183.0	57.0	0.93
Rainbow Trout	≥200 mm	3	3	3	4	77	15.57	30	31	13.90	48	274.0	203.3	0.97
Rainbow Trout	ALL	4	4	4	4	102	17.02	40	41	15.20	64	251.3	166.8	0.96
White Sucker	ALL	1	1	1	1	26	***	10	10	***	16	***	***	***

Site Number: 82 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 82
Legal Description: S00,R00E,T
Stream Classification: BNT2

Date Sampled: 01 JUL 2009
Site Length (m): 100
Mean Width (m): 4.5
Number of Passes: 3

Conductivity (µmhos): 316
pH: 8.6
Water Temperature (°C): 13.8
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brown Trout	<200 mm	16	17	16	21	376	12.42	170	152	11.09	274	138.7	33.1	1.14
Brown Trout	≥200 mm	6	6	6	6	133	20.70	60	54	18.48	97	245.8	156.2	1.01
Brown Trout	ALL	22	23	22	27	508	33.85	230	206	30.23	370	167.9	66.6	1.11
White Sucker	ALL	3	3	3	4	66	11.07	30	27	9.88	48	232.0	167.0	1.34

Population and Biomass Estimates for Castle Creek. (Continued)

Site Number: 102 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 102
Legal Description: S00,R00E,T
Stream Classification: BNT2 RBT2

Date Sampled: 06 JUL 2009
Site Length (m): 100
Mean Width (m): 4.3
Number of Passes: 4

Conductivity (µmhos): 188
pH: 8.6
Water Temperature (°C): 16.7
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brown Trout	<200 mm	41	42	41	45	981	18.68	420	397	16.68	676	118.4	19.0	1.13
Brown Trout	≥200 mm	5	5	5	5	117	12.54	50	47	11.20	80	220.0	107.4	1.00
Brown Trout	ALL	46	46	46	48	1,074	30.78	460	435	27.48	740	129.4	28.7	1.12
Rainbow Trout	≥200 mm	2	2	2	2	47	12.14	20	19	10.84	32	298.0	260.0	0.97
Rainbow Trout	ALL	2	2	2	2	47	12.14	20	19	10.84	32	298.0	260.0	0.97

Site Number: 111 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 111
Legal Description: S00,R00E,T
Stream Classification: BNT3 RBT2

Date Sampled: 07 JUL 2009
Site Length (m): 100
Mean Width (m): 5.6
Number of Passes: 3

Conductivity (µmhos): 336
pH: 8.5
Water Temperature (°C): 16.4
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brown Trout	<200 mm	27	29	27	34	522	9.67	290	211	8.63	467	119.0	18.5	1.02
Brown Trout	≥200 mm	1	1	1	1	18	2.12	10	7	1.90	16	225.0	118.0	1.04
Brown Trout	ALL	28	30	28	35	540	11.92	300	219	10.64	483	122.8	22.1	1.02
Rainbow Trout	≥200 mm	1	1	1	1	18	7.20	10	7	6.43	16	372.0	400.0	0.78
Rainbow Trout	ALL	1	1	1	1	18	7.20	10	7	6.43	16	372.0	400.0	0.78

Population and Biomass Estimates for Castle Creek. (Continued)

Site Number: 140 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 140
Legal Description: S00,R00E,T
Stream Classification: BNT2

Date Sampled: 08 JUL 2009
Site Length (m): 100
Mean Width (m): 5.4
Number of Passes: 3

Conductivity (µmhos): 382
pH: 8.4
Water Temperature (°C): 15.8
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brown Trout	<200 mm	17	17	17	18	316	9.16	170	128	8.18	274	116.6	29.0	0.92
Brown Trout	≥200 mm	4	4	4	4	74	8.34	40	30	7.45	64	225.5	112.3	0.98
Brown Trout	ALL	21	21	21	22	390	17.50	210	158	15.63	338	137.4	44.9	0.93

Site Number: 153 Survey Completed by:
Site Description: 153
Legal Description: S00,R00E,T
Stream Classification: BNT3

Date Sampled: 08 JUL 2009
Site Length (m): 100
Mean Width (m): 6.0
Number of Passes: 2

Conductivity (µmhos): 390
pH: 8.9
Water Temperature (°C): 19.4
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brown Trout	<200 mm	7	7	7	7	117	4.98	70	48	4.45	113	155.3	42.4	0.97
Brown Trout	≥200 mm	2	2	2	2	34	3.81	20	14	3.40	32	217.5	113.5	1.10
Brown Trout	ALL	9	9	9	9	151	8.79	90	61	7.85	145	169.1	58.2	1.00

Population and Biomass Estimates for Castle Creek. (Continued)

Site Number: 181 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 181
Legal Description: S00,R00E,T
Stream Classification: BNT2 RBT2

Date Sampled: 09 JUN 2009
Site Length (m): 100
Mean Width (m): 4.1
Number of Passes: 3

Conductivity (µmhos): 382
pH: 8.6
Water Temperature (°C): 15.9
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brown Trout	<200 mm	16	16	16	17	387	14.36	160	157	12.82	257	141.1	37.1	1.24
Brown Trout	≥200 mm	4	4	4	5	97	11.17	40	39	9.97	64	222.5	115.5	1.04
Brown Trout	ALL	20	20	20	21	484	25.53	200	196	22.79	322	157.4	52.8	1.20
Mountain Sucker	ALL	1	1	1	1	24	0.73	10	10	0.65	16	134.0	30.0	1.25
Rainbow Trout	≥200 mm	1	1	1	1	24	4.67	10	10	4.17	16	272.0	193.0	0.96
Rainbow Trout	ALL	1	1	1	1	24	4.67	10	10	4.17	16	272.0	193.0	0.96
White Sucker	ALL	1	1	1	2	24	0.53	10	10	0.47	16	133.0	22.0	0.94

Site Number: 186 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 186
Legal Description: S00,R00E,T
Stream Classification: BNT2

Date Sampled: 09 JUL 2009
Site Length (m): 100
Mean Width (m): 4.8
Number of Passes: 3

Conductivity (µmhos): 390
pH: 8.4
Water Temperature (°C): 13.0
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brown Trout	<200 mm	35	36	35	39	757	25.77	360	307	23.01	579	140.5	34.0	1.14
Brown Trout	≥200 mm	3	3	3	4	63	6.04	30	26	5.39	48	215.7	95.7	0.96
Brown Trout	ALL	38	39	38	42	820	31.90	390	332	28.49	628	146.5	38.9	1.12

Population and Biomass Estimates for Castle Creek. (Continued)

Site Number: 204 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 204 Above bridge
Legal Description: S00,R00E,T
Stream Classification: BNT3

Date Sampled: 10 JUL 2009
Site Length (m): 100
Mean Width (m): 4.5
Number of Passes: 3

Conductivity (µmhos): 350
pH: 8.4
Water Temperature (°C): 13.9
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brown Trout	<200 mm	33	33	33	35	733	20.09	330	297	17.94	531	128.9	27.4	1.13
Brown Trout	≥200 mm	1	1	1	1	22	2.67	10	9	2.38	16	226.0	120.0	1.04
Brown Trout	ALL	34	34	34	36	756	22.76	340	306	20.32	547	131.7	30.1	1.12

Site Number: 277 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 277
Legal Description: S00,R00E,T
Stream Classification: BKT0 BNT2

Date Sampled: 15 JUL 2009
Site Length (m): 100
Mean Width (m): 5.0
Number of Passes: 3

Conductivity (µmhos): 369
pH: 8.8
Water Temperature (°C): 10.9
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brook Trout	<200 mm	2	2	2	2	40	2.17	20	16	1.94	32	162.5	54.0	1.24
Brook Trout	ALL	2	2	2	2	40	2.17	20	16	1.94	32	162.5	54.0	1.24
Brown Trout	<200 mm	33	34	33	37	682	25.21	340	276	22.51	547	142.3	36.9	1.10
Brown Trout	≥200 mm	6	6	6	6	120	16.66	60	49	14.88	97	231.8	138.3	1.10
Brown Trout	ALL	39	40	39	43	803	42.51	400	325	37.96	644	156.1	52.9	1.10

Population and Biomass Estimates for Castle Creek. (Continued)

Site Number: 287 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 287
Legal Description: S00,R00E,T
Stream Classification: BKT3 BNT2

Date Sampled: 15 JUL 2009
Site Length (m): 100
Mean Width (m): 5.9
Number of Passes: 3

Conductivity (µmhos): 350
pH: 9.1
Water Temperature (°C): 15.6
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brook Trout	<200 mm	1	1	1	1	17	1.14	10	7	1.01	16	178.0	67.0	1.19
Brook Trout	≥200 mm	2	2	2	2	34	4.76	20	14	4.25	32	219.0	140.5	1.33
Brook Trout	ALL	3	3	3	3	51	5.90	30	21	5.27	48	205.3	116.0	1.28
Brown Trout	<200 mm	27	27	27	28	458	19.71	270	185	17.60	434	149.0	43.1	1.19
Brown Trout	≥200 mm	6	6	6	6	102	21.12	60	41	18.86	97	253.2	207.7	1.22
Brown Trout	ALL	33	33	33	34	559	41.35	330	227	36.92	531	167.9	73.9	1.19

Site Number: 312 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 312
Legal Description: S00,R00E,T
Stream Classification: BKT2 BNT2

Date Sampled: 30 JUN 2009
Site Length (m): 100
Mean Width (m): 5.0
Number of Passes: 3

Conductivity (µmhos): 355
pH: 8.9
Water Temperature (°C): 12.5
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brook Trout	<200 mm	39	50	39	70	1,009	38.17	500	409	34.08	805	103.0	37.8	1.21
Brook Trout	≥200 mm	5	5	5	6	101	12.66	50	41	11.30	80	220.8	125.4	1.16
Brook Trout	ALL	44	54	44	71	1,090	58.27	540	441	52.03	869	116.4	53.5	1.20
Brown Trout	<200 mm	20	21	20	25	424	16.23	210	172	14.49	338	146.7	38.3	1.20
Brown Trout	≥200 mm	12	12	12	12	242	40.06	120	98	35.77	193	241.6	165.4	1.15
Brown Trout	ALL	32	32	32	34	646	55.52	320	262	49.58	515	182.3	86.0	1.18

Population and Biomass Estimates for Castle Creek. (Continued)

Site Number: 332 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 332
Legal Description: S00,R00E,T
Stream Classification: BKT2 BNT3

Date Sampled: 29 JUN 2009
Site Length (m): 100
Mean Width (m): 6.5
Number of Passes: 3

Conductivity (µmhos): 370
pH: 8.8
Water Temperature (°C): 13.0
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brook Trout	<200 mm	11	11	11	11	168	5.90	110	68	5.27	177	143.4	35.1	1.12
Brook Trout	≥200 mm	12	12	12	12	183	23.96	120	74	21.39	193	221.9	130.7	1.18
Brook Trout	ALL	23	23	23	24	351	29.85	230	142	26.65	370	184.3	85.0	1.15
Brown Trout	<200 mm	19	19	19	21	290	9.47	190	118	8.46	306	139.6	32.6	1.18
Brown Trout	≥200 mm	3	3	3	4	46	8.45	30	19	7.54	48	243.3	184.3	1.26
Brown Trout	ALL	22	22	22	24	336	17.92	220	136	16.00	354	153.8	53.3	1.19
White Sucker	ALL	1	1	1	2	15	2.08	10	6	1.86	16	221.0	136.0	1.26

Site Number: 343 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 343 (Old site 13)
Legal Description: S00,R00E,T
Stream Classification: BKT2 BNT2

Date Sampled: 18 JUN 2009
Site Length (m): 100
Mean Width (m): 5.9
Number of Passes: 3

Conductivity (µmhos): 364
pH: 8.7
Water Temperature (°C): 11.6
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brook Trout	<200 mm	15	16	15	20	273	10.60	160	111	9.47	257	150.1	38.8	1.07
Brook Trout	≥200 mm	5	5	5	5	85	12.20	50	35	10.89	80	228.2	142.8	1.19
Brook Trout	ALL	20	20	20	22	342	22.14	200	138	19.77	322	169.6	64.8	1.10
Brown Trout	<200 mm	11	12	11	17	205	5.37	120	83	4.79	193	129.4	26.2	1.08
Brown Trout	≥200 mm	16	16	16	17	273	49.88	160	111	44.53	257	246.1	182.5	1.15
Brown Trout	ALL	27	27	27	29	461	54.80	270	187	48.92	434	198.5	118.8	1.12

Population and Biomass Estimates for Castle Creek. (Continued)

Site Number: 362 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 362
Legal Description: S00,R00E,T
Stream Classification: BKT2 BNT2

Date Sampled: 18 JUN 2009
Site Length (m): 100
Mean Width (m): 5.4
Number of Passes: 3

Conductivity (µmhos): 374
pH: 8.5
Water Temperature (°C): 8.8
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brook Trout	<200 mm	30	32	30	38	597	14.74	320	242	13.16	515	129.1	24.7	1.08
Brook Trout	≥200 mm	12	12	12	12	224	32.65	120	91	29.15	193	237.8	145.9	1.02
Brook Trout	ALL	42	43	42	46	802	47.57	430	325	42.47	692	160.2	59.3	1.06
Brown Trout	<200 mm	26	35	26	55	653	22.89	350	264	20.44	563	142.4	35.1	1.05
Brown Trout	≥200 mm	16	16	16	17	298	51.20	160	121	45.71	257	237.2	171.6	1.21
Brown Trout	ALL	42	47	42	56	876	76.32	470	355	68.14	756	178.5	87.1	1.11

Site Number: 414 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 414
Legal Description: S00,R00E,T
Stream Classification: BKT2 RBT0

Date Sampled: 27 AUG 2009
Site Length (m): 100
Mean Width (m): 4.1
Number of Passes: 3

Conductivity (µmhos): 464
pH: ****
Water Temperature (°C): 13.7
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brook Trout	<200 mm	57	57	57	59	1,375	41.13	570	557	36.72	917	139.9	29.9	1.04
Brook Trout	≥200 mm	5	5	5	6	121	25.74	50	49	22.98	80	288.2	213.4	0.89
Brook Trout	ALL	62	62	62	64	1,496	66.87	620	606	59.71	998	151.9	44.7	1.03
Rainbow Trout	<200 mm	14	14	14	15	338	11.36	140	137	10.14	225	144.8	33.6	1.09
Rainbow Trout	ALL	14	14	14	15	338	11.36	140	137	10.14	225	144.8	33.6	1.09
Rock Bass	ALL	42	42	42	44	1,013	***	420	410	***	676	***	***	***

Population and Biomass Estimates for Castle Creek. (Continued)

Site Number: 417 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 417
Legal Description: S00,R00E,T
Stream Classification: BKT3 RBT0

Date Sampled: 28 AUG 2009
Site Length (m): 100
Mean Width (m): 3.0
Number of Passes: 3

Conductivity (µmhos): 461
pH: 8.8
Water Temperature (°C): 13.2
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brook Trout	<200 mm	61	61	61	62	2,021	57.87	610	819	51.67	981	127.6	28.6	1.15
Brook Trout	≥200 mm	1	1	1	1	33	5.43	10	13	4.85	16	276.0	164.0	0.78
Brook Trout	ALL	62	62	62	63	2,054	64.07	620	832	57.20	998	130.0	31.2	1.15
Rainbow Trout	<200 mm	7	7	7	8	232	9.51	70	94	8.49	113	156.1	41.0	1.07
Rainbow Trout	ALL	7	7	7	8	232	9.51	70	94	8.49	113	156.1	41.0	1.07

Site Number: 426 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 426
Legal Description: S00,R00E,T
Stream Classification: BKT2 RBT2

Date Sampled: 21 AUG 2009
Site Length (m): 100
Mean Width (m): 2.6
Number of Passes: 3

Conductivity (µmhos): ****
pH: 8.7
Water Temperature (°C): 11.5
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brook Trout	<200 mm	98	98	98	99	3,717	94.46	980	1,505	84.34	1,577	132.3	25.4	1.05
Brook Trout	≥200 mm	5	5	5	5	190	25.00	50	77	22.32	80	225.4	131.8	1.12
Brook Trout	ALL	103	103	103	104	3,907	119.66	1,030	1,582	106.84	1,657	136.8	30.6	1.05
Rainbow Trout	<200 mm	10	10	10	10	379	17.07	100	154	15.24	161	156.6	45.0	1.14
Rainbow Trout	≥200 mm	1	1	1	1	38	4.93	10	15	4.40	16	221.0	130.0	1.20
Rainbow Trout	ALL	11	11	11	11	417	22.00	110	169	19.64	177	162.5	52.7	1.15
Rock Bass	ALL	4	4	4	4	152	***	40	61	***	64	***	***	***

Population and Biomass Estimates for Castle Creek. (Continued)

Site Number: 428 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 428
Legal Description: S00,R00E,T
Stream Classification: BKT3 RBT2

Date Sampled: 21 AUG 2009
Site Length (m): 100
Mean Width (m): 2.3
Number of Passes: 3

Conductivity (µmhos): 462
pH: 8.7
Water Temperature (°C): 11.5
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brook Trout	<200 mm	63	63	63	64	2,783	70.17	630	1,127	62.65	1,014	131.7	25.2	1.02
Brook Trout	≥200 mm	1	1	1	1	44	8.00	10	18	7.14	16	275.0	181.0	0.87
Brook Trout	ALL	64	64	64	65	2,827	78.39	640	1,145	69.99	1,030	133.9	27.7	1.01
Rainbow Trout	<200 mm	3	3	3	4	133	6.94	30	54	6.19	48	166.3	52.3	1.07
Rainbow Trout	≥200 mm	1	1	1	1	44	4.20	10	18	3.75	16	200.0	95.0	1.19
Rainbow Trout	ALL	4	4	4	5	177	11.13	40	72	9.94	64	174.8	63.0	1.10

Site Number: 450 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 450
Legal Description: S00,R00E,T
Stream Classification: BKT0

Date Sampled: 26 AUG 2009
Site Length (m): 100
Mean Width (m): 2.5
Number of Passes: 3

Conductivity (µmhos): 311
pH: 442.0
Water Temperature (°C): 15.2
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brook Trout	<200 mm	101	123	101	147	4,920	152.06	1,230	1,993	135.77	1,979	98.0	30.9	1.18
Brook Trout	ALL	101	123	101	147	4,920	152.06	1,230	1,993	135.77	1,979	98.0	30.9	1.18

Site Number: 463 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 463
Legal Description: S00,R00E,T
Stream Classification: BKT0 RBT1

Date Sampled: 26 AUG 2009
Site Length (m): 100
Mean Width (m): 2.4
Number of Passes: 3

Conductivity (µmhos): 431
pH: ****
Water Temperature (°C): 16.7
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brook Trout	<200 mm	50	54	50	61	2,293	36.89	540	929	32.93	869	106.3	16.1	1.01
Brook Trout	ALL	50	54	50	61	2,293	36.89	540	929	32.93	869	106.3	16.1	1.01
Rainbow Trout	≥200 mm	2	2	2	2	85	25.61	20	34	22.87	32	303.5	301.5	1.08
Rainbow Trout	ALL	2	2	2	2	85	25.61	20	34	22.87	32	303.5	301.5	1.08

Population and Biomass Estimates for Castle Creek. (Continued)

Site Number: 467 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 467
Legal Description: S00,R00E,T
Stream Classification: BKT0 RBT0

Date Sampled: 26 AUG 2009
Site Length (m): 100
Mean Width (m): 2.4
Number of Passes: 3

Conductivity (µmhos): 442
pH: ****
Water Temperature (°C): 15.2
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brook Trout	<200 mm	142	144	142	148	5,933	121.96	1,440	2,403	108.89	2,317	118.1	20.6	0.99
Brook Trout	ALL	142	144	142	148	5,933	121.96	1,440	2,403	108.89	2,317	118.1	20.6	0.99
Rainbow Trout	<200 mm	1	1	1	1	41	0.95	10	17	0.85	16	129.0	23.0	1.07
Rainbow Trout	ALL	1	1	1	1	41	0.95	10	17	0.85	16	129.0	23.0	1.07

Appendix B: Population and Biomass Estimates for Castle Creek - South Fork.

Site Number: 20 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 20
Legal Description: S00,R00E,T
Stream Classification: BKT1 RBT0

Date Sampled: 01 SEP 2009
Site Length (m): 100
Mean Width (m): 5.5
Number of Passes: 3

Conductivity (µmhos): 458
pH: 8.8
Water Temperature (°C): 15.3
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brook Trout	<200 mm	178	184	178	191	3,373	108.05	1,840	1,366	96.48	2,961	130.6	32.0	1.20
Brook Trout	≥200 mm	32	32	32	34	587	93.23	320	238	83.24	515	251.6	158.9	1.00
Brook Trout	ALL	210	218	210	226	3,997	212.97	2,180	1,619	190.16	3,508	149.0	53.3	1.17
Rainbow Trout	<200 mm	11	12	11	17	220	6.74	120	89	6.02	193	119.7	30.6	1.06
Rainbow Trout	ALL	11	12	11	17	220	6.74	120	89	6.02	193	119.7	30.6	1.06

Population and Biomass Estimates for Castle Creek - South Fork. (Continued)

Site Number: 46 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 46
Legal Description: S00,R00E,T
Stream Classification: BKT1 RBT0

Date Sampled: 03 SEP 2009
Site Length (m): 80
Mean Width (m): 2.3
Number of Passes: 3

Conductivity (µmhos): 475
pH: 8.7
Water Temperature (°C): 12.0
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brook Trout	<200 mm	151	328	151	560	18,000	616.03	4,100	7,290	550.04	6,597	104.3	34.2	1.06
Brook Trout	≥200 mm	14	17	14	27	933	134.14	213	378	119.77	342	237.6	143.8	1.05
Brook Trout	ALL	165	346	165	565	18,988	1,009.40	4,325	7,690	901.27	6,959	115.6	53.2	1.06
Rainbow Trout	<200 mm	7	7	7	8	384	15.98	88	156	14.27	141	122.3	41.6	1.09
Rainbow Trout	ALL	7	7	7	8	384	15.98	88	156	14.27	141	122.3	41.6	1.09

Site Number: 47 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 47
Legal Description: S00,R00E,T
Stream Classification: BKT0

Date Sampled: 03 SEP 2009
Site Length (m): 100
Mean Width (m): 3.0
Number of Passes: 3

Conductivity (µmhos): 461
pH: 8.8
Water Temperature (°C): 11.9
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brook Trout	<200 mm	79	82	79	87	2,733	60.91	820	1,107	54.39	1,319	87.5	22.3	1.08
Brook Trout	ALL	79	82	79	87	2,733	60.91	820	1,107	54.39	1,319	87.5	22.3	1.08

Site Number: 54 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 54
Legal Description: S00,R00E,T
Stream Classification: BKT0

Date Sampled: 31 AUG 2009
Site Length (m): 100
Mean Width (m): 2.2
Number of Passes: 3

Conductivity (µmhos): 465
pH: 8.6
Water Temperature (°C): 9.7
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brook Trout	<200 mm	47	47	47	48	2,110	58.09	470	855	51.87	756	114.8	27.5	1.10
Brook Trout	ALL	47	47	47	48	2,110	58.09	470	855	51.87	756	114.8	27.5	1.10

Population and Biomass Estimates for Castle Creek - South Fork. (Continued)

Site Number: 61 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 61
Legal Description: S00,R00E,T
Stream Classification: BKT0

Date Sampled: 31 AUG 2009
Site Length (m): 100
Mean Width (m): 1.6
Number of Passes: 3

Conductivity (µmhos): 421
pH: 8.7
Water Temperature (°C): 13.6
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brook Trout	<200 mm	70	70	70	72	4,451	173.58	700	1,803	154.99	1,126	89.1	39.0	1.20
Brook Trout	ALL	70	70	70	72	4,451	173.58	700	1,803	154.99	1,126	89.1	39.0	1.20

Appendix C. Population and Biomass Estimates for Spring Creek (Trib. of Cheyenne).

Site Number: 1 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: USFS Camp-Sheridan Lake Road (1984 site 24)
Legal Description: S5,R6E,T1S
Stream Classification: BNT3

Date Sampled: 13 AUG 2009
Site Length (m): 100
Mean Width (m): 9.7
Number of Passes: 1

Conductivity (µmhos): 336
pH: 8.7
Water Temperature (°C): 19.0
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brown Trout	≥200 mm	2	2	2	2	21	4.46	20	8	3.98	32	266.0	216.0	1.15
Brown Trout	ALL	2	2	2	2	21	4.46	20	8	3.98	32	266.0	216.0	1.15
White Sucker	ALL	8	8	8	8	83	9.92	80	33	8.85	129	192.9	120.0	1.13
Creek Chub	ALL	28	28	28	28	289	***	280	117	***	451	***	***	***

Population and Biomass Estimates for Spring Creek (Trib. of Cheyenne). (Continued)

Site Number: 4 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: SDGF&P property
Legal Description: S22,R4E,T2S
Stream Classification: BKT3 BNT2 RBT2

Date Sampled: 23 JUL 2009
Site Length (m): 100
Mean Width (m): 2.0
Number of Passes: 1

Conductivity (µmhos): 348
pH: 348.0
Water Temperature (°C): 17.4
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brook Trout	<200 mm	31	31	31	31	1,571	54.73	310	636	48.86	499	127.1	34.8	1.13
Brook Trout	≥200 mm	1	1	1	1	51	5.58	10	21	4.98	16	215.0	110.0	1.11
Brook Trout	ALL	32	32	32	32	1,622	61.57	320	657	54.98	515	129.8	38.0	1.13
Brown Trout	≥200 mm	3	3	3	3	152	38.88	30	62	34.72	48	288.7	255.7	1.05
Brown Trout	ALL	3	3	3	3	152	38.88	30	62	34.72	48	288.7	255.7	1.05
Longnose Dace	ALL	22	22	22	22	1,115	***	220	452	***	354	64.5	***	***
Rainbow Trout	≥200 mm	1	1	1	1	51	12.98	10	21	11.59	16	302.0	256.0	0.93
Rainbow Trout	ALL	1	1	1	1	51	12.98	10	21	11.59	16	302.0	256.0	0.93

Site Number: 6 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: Upstream of Confluence with Bobcat Gulch (1984 site 4)
Legal Description: S3,R3E,T2S
Stream Classification: BKT0

Date Sampled: 27 JUL 2009
Site Length (m): 100
Mean Width (m): 0.8
Number of Passes: 1

Conductivity (µmhos): 503
pH: 8.6
Water Temperature (°C): 11.4
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brook Trout	<200 mm	7	7	7	7	865	27.86	70	350	24.87	113	114.4	32.2	1.15
Brook Trout	ALL	7	7	7	7	865	27.86	70	350	24.87	113	114.4	32.2	1.15

Population and Biomass Estimates for Spring Creek (Trib. of Cheyenne). (Continued)

Site Number: 7 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 0.5 miles South of 3 Forks (1984 riparian site 20) Richard Swift Property
Legal Description: S22,R5E,T1S
Stream Classification:

Date Sampled: 23 JUL 2009
Site Length (m): 100
Mean Width (m): 4.9
Number of Passes: 1

Conductivity (µmhos): 346
pH: 9.0
Water Temperature (°C): 23.3
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Creek Chub	ALL	69	69	69	69	1,395	***	690	565	***	1,110	***	***	***
Longnose Dace	ALL	101	101	101	101	2,042	***	1,010	827	***	1,625	***	***	***
White Sucker	ALL	14	14	14	14	283	***	140	115	***	225	***	***	***

Site Number: 8 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: Stratobowl area
Legal Description: S12,R6E,T1S
Stream Classification: RBT2

Date Sampled: 03 AUG 2009
Site Length (m): 100
Mean Width (m): 7.5
Number of Passes: 1

Conductivity (µmhos): 341
pH: 8.6
Water Temperature (°C): 20.6
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Rainbow Trout	≥200 mm	1	1	1	1	13	7.49	10	5	6.68	16	369.0	558.0	1.11
Rainbow Trout	ALL	1	1	1	1	13	7.49	10	5	6.68	16	369.0	558.0	1.11
Creek Chub	ALL	565	565	565	565	7,579	***	5,650	3,070	***	9,091	***	***	***
Rock Bass	ALL	4	4	4	4	54	***	40	22	***	64	***	***	***
White Sucker	ALL	133	133	133	133	1,784	***	1,330	723	***	2,140	***	***	***

Population and Biomass Estimates for Spring Creek (Trib. of Cheyenne). (Continued)

Site Number: 10 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: Between 1st and 2nd bridges upstream of Sheridan Lake Road
Legal Description: S4,R6E,T1S
Stream Classification:

Date Sampled: 13 AUG 2009
Site Length (m): 100
Mean Width (m): 8.2
Number of Passes: 1

Conductivity (µmhos): 337
pH: 8.9
Water Temperature (°C): 20.3
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Creek Chub	ALL	34	34	34	34	414	***	340	168	***	547	***	***	***
White Sucker	ALL	5	5	5	5	61	***	50	25	***	80	***	***	***

Site Number: 12 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: Lower end of walk-in area.
Legal Description: S7,R6E,T1S
Stream Classification: RBT2

Date Sampled: 24 JUL 2009
Site Length (m): 100
Mean Width (m): 10.6
Number of Passes: 1

Conductivity (µmhos): 332
pH: 8.5
Water Temperature (°C): 22.0
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Creek Chub	ALL	35	35	35	35	330	12.15	350	134	10.85	563	124.2	36.8	1.32
Golden Shiner	ALL	2	2	2	2	19	0.51	20	8	0.46	32	140.5	27.0	0.92
Rainbow Trout	≥200 mm	3	3	3	3	28	7.41	30	11	6.62	48	295.7	261.7	0.99
Rainbow Trout	ALL	3	3	3	3	28	7.41	30	11	6.62	48	295.7	261.7	0.99
Rock Bass	ALL	1	1	1	1	9	0.76	10	4	0.68	16	155.0	81.0	2.18
White Sucker	ALL	30	30	30	30	283	61.72	300	115	55.11	483	256.4	217.9	1.12
Yellow Perch	ALL	1	1	1	1	9	0.10	10	4	0.09	16	97.0	11.0	1.21

Population and Biomass Estimates for Spring Creek (Trib. of Cheyenne). (Continued)

Site Number: 14 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: Storm Mountain Camp
Legal Description: S15,R6E,T1S
Stream Classification: RBT2

Date Sampled: 03 AUG 2009
Site Length (m): 100
Mean Width (m): 8.0
Number of Passes: 1

Conductivity (µmhos): ****
pH: ****
Water Temperature (°C): ****
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Black Bullhead	ALL	1	1	1	1	12	2.06	10	5	1.84	16	200.0	165.0	2.06
Northern Pike	ALL	3	3	3	3	37	2.74	30	15	2.45	48	201.7	73.3	0.68
Rainbow Trout	≥200 mm	1	1	1	1	12	12.93	10	5	11.55	16	468.0	1,038.0	1.01
Rainbow Trout	ALL	1	1	1	1	12	12.93	10	5	11.55	16	468.0	1,038.0	1.01
Creek Chub	ALL	55	55	55	55	685	***	550	277	***	885	***	***	***
Rock Bass	ALL	25	25	25	25	311	***	250	126	***	402	***	***	***
White Sucker	ALL	30	30	30	30	374	***	300	151	***	483	***	***	***

Appendix D. Population and Biomass Estimates for Horse Creek.

Site Number: 1 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 1984 site 3
Legal Description: S33,R5E,T1N
Stream Classification: NWT

Date Sampled: 13 MAY 2009
Site Length (m): 100
Mean Width (m): 1.4
Number of Passes: 1

Conductivity (µmhos): 180
pH: 9.7
Water Temperature (°C): 9.0
Air Temperature (°C): 16.6

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Longnose Dace	ALL	4	4	4	4	280	1.12	40	114	1.00	64	54.3	4.0	1.77

Site Number: 2 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: Below Highway 385
Legal Description: S11,R5E,T1S
Stream Classification: NWT

Date Sampled: 13 MAY 2009
Site Length (m): 100
Mean Width (m): 2.4
Number of Passes: 1

Conductivity (µmhos): 255
pH: 9.5
Water Temperature (°C): 11.2
Air Temperature (°C): 17.7

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Longnose Dace	ALL	22	22	22	22	924	1.72	220	374	1.54	354	49.3	1.9	1.42

Appendix E. Population and Biomass Estimates for Palmer Gulch.

Site Number: 1 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 100 meters upstram of USFS 244 bridge
Legal Description: S4,R5E,T2S
Stream Classification: NWT

Date Sampled: 13 MAY 2009
Site Length (m): 100
Mean Width (m): 1.7
Number of Passes: 1

Conductivity (µmhos): 50
pH: 7.6
Water Temperature (°C): 6.3
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Longnose Dace	ALL	1	1	1	1	58	***	10	24	***	16	73.0	***	***
White Sucker	ALL	14	14	14	14	815	40.82	140	330	36.45	225	129.6	50.1	1.03

Appendix F. Population and Biomass Estimates for Willow Creek (Trib. of Palmer).

Site Number: 1 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 01
Legal Description: S00,R00E,T
Stream Classification: BKT0

Date Sampled: 11 JUN 2009
Site Length (m): 100
Mean Width (m): 1.3
Number of Passes: 1

Conductivity (µmhos): 50
pH: 8.1
Water Temperature (°C): 7.1
Air Temperature (°C): 9.0

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brook Trout	<200 mm	9	9	9	9	678	27.58	90	275	24.62	145	75.6	40.7	1.18
Brook Trout	ALL	9	9	9	9	678	27.58	90	275	24.62	145	75.6	40.7	1.18
White Sucker	ALL	4	4	4	4	301	8.74	40	122	7.80	64	147.8	29.0	1.11

Appendix G. Population and Biomass Estimates for Newton Fork Creek.

Site Number: 1 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 0.2 miles below Burnt Fork Confluence (1984 site 6)
Legal Description: S14,R4E,T1S
Stream Classification: BKT2 RBT2

Date Sampled: 20 MAY 2009
Site Length (m): 100
Mean Width (m): 3.0
Number of Passes: 1

Conductivity (µmhos): 170
pH: 8.4
Water Temperature (°C): 13.5
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brook Trout	<200 mm	9	9	9	9	302	11.28	90	122	10.07	145	149.1	37.3	1.10
Brook Trout	≥200 mm	2	2	2	2	67	6.88	20	27	6.14	32	208.0	102.5	1.13
Brook Trout	ALL	11	11	11	11	369	18.15	110	149	16.21	177	159.8	49.2	1.11
Rainbow Trout	≥200 mm	1	1	1	1	34	7.48	10	14	6.68	16	286.0	223.0	0.95
Rainbow Trout	ALL	1	1	1	1	34	7.48	10	14	6.68	16	286.0	223.0	0.95
Longnose Dace	ALL	18	18	18	18	604	***	180	245	***	290	***	***	***

Appendix H. Population and Biomass Estimates for Sunday Gulch.

Site Number: **1** Survey Completed by: South Dakota Game, Fish and Parks
Site Description: Below Horsethief Resort on SDGF&P land
Legal Description: S13,R4E,T2S
Stream Classification: No Fish Captured

Date Sampled: 13 MAY 2009
Site Length (m): 100
Mean Width (m): 1.7
Number of Passes: 1

Conductivity (µmhos): 73
pH: 7.7
Water Temperature (°C): 8.6
Air Temperature (°C): ****

Appendix I. Population and Biomass Estimates for Tenderfoot Creek.

Site Number: 1 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: Upstream of Pennington/Custer county line
Legal Description: S22,R4E,T2S
Stream Classification: No Fish Captured

Date Sampled: 15 MAY 2009
Site Length (m): 100
Mean Width (m): 0.8
Number of Passes: 1

Conductivity (µmhos): 386
pH: 7.8
Water Temperature (°C): 6.9
Air Temperature (°C): ****

Appendix J. Population and Biomass Estimates for Vonderlehr Creek.

Site Number: 2 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: Reno Gulch road culvert
Legal Description: S00,R00E,T
Stream Classification: BKT0

Date Sampled: 05 JUN 2009
Site Length (m): 100
Mean Width (m): 0.7
Number of Passes: 1

Conductivity (µmhos): 437
pH: 8.3
Water Temperature (°C): 10.5
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brook Trout	<200 mm	3	3	3	3	407	8.28	30	165	7.40	48	117.7	20.3	1.20
Brook Trout	ALL	3	3	3	3	407	8.28	30	165	7.40	48	117.7	20.3	1.20

Appendix K. Population and Biomass Estimates for Battle Creek.

Site Number: 1 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: South of Hayward (1984 site 11)
Legal Description: S19,R7E,T2S
Stream Classification: BNT3

Date Sampled: 26 JUN 2009
Site Length (m): 100
Mean Width (m): 4.8
Number of Passes: 1

Conductivity (µmhos): 353
pH: 8.5
Water Temperature (°C): 22.7
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brown Trout	<200 mm	2	2	2	2	42	0.04	20	17	0.04	32	67.5	1.0	0.33
Brown Trout	≥200 mm	1	1	1	1	21	7.49	10	9	6.69	16	485.0	357.0	0.31
Brown Trout	ALL	3	3	3	3	63	7.54	30	26	6.73	48	206.7	119.7	0.32
Creek Chub	ALL	52	52	52	52	1,092	***	520	442	***	837	***	***	***
Longnose Dace	ALL	1	1	1	1	21	***	10	9	***	16	***	***	***
Rock Bass	ALL	2	2	2	2	42	***	20	17	***	32	***	***	***
White Sucker	ALL	23	23	23	23	483	***	230	196	***	370	***	***	***

Appendix L. Population and Biomass Estimates for Battle Creek (continued).

Site Number: 2 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: Above confluence with Iron Creek South
Legal Description: S13,R6E,T2S
Stream Classification: NWT

Date Sampled: 12 JUN 2009
Site Length (m): 100
Mean Width (m): 6.6
Number of Passes: 1

Conductivity (µmhos): 281
pH: 8.2
Water Temperature (°C): 10.2
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Creek Chub	ALL	107	107	107	107	1,626	***	1,070	658	***	1,722	90.7	***	***
White Sucker	ALL	51	51	51	51	775	***	510	314	***	821	152.9	***	***
Fathead Minnow	ALL	2	2	2	2	30	***	20	12	***	32	***	***	***
Longnose Dace	ALL	12	12	12	12	182	***	120	74	***	193	***	***	***

Site Number: 3 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: Below Keystone (1984 site 6)
Legal Description: S4,R6E,T2S
Stream Classification: BKT0

Date Sampled: 25 JUN 2009
Site Length (m): 100
Mean Width (m): 6.2
Number of Passes: 1

Conductivity (µmhos): 194
pH: 8.2
Water Temperature (°C): 19.0
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brook Trout	<200 mm	2	2	2	2	32	2.51	20	13	2.25	32	184.5	77.5	1.22
Brook Trout	ALL	2	2	2	2	32	2.51	20	13	2.25	32	184.5	77.5	1.22
White Sucker	ALL	7	7	7	7	114	4.22	70	46	3.77	113	113.3	37.1	0.88

Site Number: 5 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: Up from Hippie Hole
Legal Description: S00,R00E,T
Stream Classification: BNT0

Date Sampled: 24 JUN 2009
Site Length (m): 100
Mean Width (m): 5.7
Number of Passes: 1

Conductivity (µmhos): ****
pH: ****
Water Temperature (°C): ****
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brown Trout	<200 mm	1	1	1	1	17	***	10	7	***	16	52.0	***	***
Brown Trout	ALL	1	1	1	1	17	***	10	7	***	16	52.0	***	***
Creek Chub	ALL	194	194	194	194	3,387	***	1,940	1,372	***	3,121	***	***	***
Fathead Minnow	ALL	34	34	34	34	594	***	340	240	***	547	***	***	***
Longnose Dace	ALL	68	68	68	68	1,187	***	680	481	***	1,094	***	***	***
White Sucker	ALL	49	49	49	49	856	***	490	347	***	788	***	***	***

Appendix M. Population and Biomass Estimates for Battle Creek (continued).

Site Number: 9 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 1/2 mi Dwn from Hippie Hole
Legal Description: S00,R00E,T
Stream Classification:

Date Sampled: 09 JUL 2009
Site Length (m): 100
Mean Width (m): 8.5
Number of Passes: 2

Conductivity (µmhos): 325
pH: 8.6
Water Temperature (°C): 11.6
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Creek Chub	ALL	481	481	481	481	5,677	***	4,810	2,299	***	7,739	***	***	***
Fathead Minnow	ALL	85	85	85	85	1,003	***	850	406	***	1,368	***	***	***
Longnose Dace	ALL	29	29	29	29	342	***	290	139	***	467	***	***	***
Mountain Sucker	ALL	2	2	2	2	24	***	20	10	***	32	***	***	***
Rock Bass	ALL	4	4	4	4	47	***	40	19	***	64	***	***	***
White Sucker	ALL	151	151	151	151	1,782	***	1,510	722	***	2,430	***	***	***

Appendix N. Population and Biomass Estimates for Grace Coolidge Creek.

Site Number: 2 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 1/2 mile avove CSP headquarters (1984 site 8)
Legal Description: S22,R6E,T3S
Stream Classification: BKT2

Date Sampled: 19 MAY 2009
Site Length (m): 100
Mean Width (m): 5.1
Number of Passes: 1

Conductivity (µmhos): 173
pH: 8.5
Water Temperature (°C): 17.4
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brook Trout	<200 mm	11	11	11	11	218	6.79	110	88	6.06	177	139.5	31.2	1.11
Brook Trout	≥200 mm	5	5	5	5	99	12.98	50	40	11.59	80	225.8	131.2	1.10
Brook Trout	ALL	16	16	16	16	317	19.76	160	128	17.65	257	166.4	62.4	1.11
Creek Chub	ALL	65	65	65	65	1,286	33.62	650	521	30.02	1,046	98.2	26.1	1.06
Longnose Dace	ALL	93	93	93	93	1,840	23.92	930	745	21.36	1,496	74.0	13.0	1.03
White Sucker	ALL	20	20	20	20	396	30.84	200	160	27.54	322	183.9	78.0	1.38

Appendix O. Population and Biomass Estimates for Grace Coolidge Creek (continued).

Site Number: 3 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: Picnic area above Black Hills Playhouse road (1984 site 4)
Legal Description: S7,R6E,T3S
Stream Classification: BKT0 RBT1

Date Sampled: 20 MAY 2009
Site Length (m): 100
Mean Width (m): 3.4
Number of Passes: 1

Conductivity (µmhos): 64
pH: 7.9
Water Temperature (°C): 12.0
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brook Trout	<200 mm	19	19	19	19	557	9.33	190	226	8.33	306	119.7	16.7	0.96
Brook Trout	ALL	19	19	19	19	557	9.33	190	226	8.33	306	119.7	16.7	0.96
Rainbow Trout	<200 mm	1	1	1	1	29	0.88	10	12	0.79	16	148.0	30.0	0.93
Rainbow Trout	≥200 mm	4	4	4	4	117	16.46	40	48	14.69	64	247.8	140.3	0.92
Rainbow Trout	ALL	5	5	5	5	147	17.34	50	59	15.48	80	227.8	118.2	0.92

Appendix P. Population and Biomass Estimates for Spokane Creek.

Site Number: 2 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: In Custer State Park near residence area
Legal Description: S2,R6E,T3S
Stream Classification: No Fish Captured

Date Sampled: 14 MAY 2009
Site Length (m): 100
Mean Width (m): 3.4
Number of Passes: 1

Conductivity (µmhos): 162
pH: 7.9
Water Temperature (°C): 13.7
Air Temperature (°C): ****

Appendix Q. Population and Biomass Estimates for Bear Gulch.

Site Number: 1 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: Below Confluence of North and South Fork
Legal Description: S11,R6E,T3S
Stream Classification: BKT2

Date Sampled: 19 MAY 2009
Site Length (m): 100
Mean Width (m): 1.3
Number of Passes: 1

Conductivity (µmhos): ****
pH: 8.0
Water Temperature (°C): 14.4
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brook Trout	<200 mm	24	24	24	24	1,833	95.26	240	743	85.05	386	158.7	52.0	1.21
Brook Trout	≥200 mm	1	1	1	1	76	6.57	10	31	5.87	16	200.0	86.0	1.08
Brook Trout	ALL	25	25	25	25	1,910	101.83	250	773	90.92	402	160.3	53.3	1.20

Appendix R. Population and Biomass Estimates for Galena Creek.

Site Number: 1 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 1985 site 3
Legal Description: S33,R6E,T3S
Stream Classification: BKT3

Date Sampled: 20 MAY 2009
Site Length (m): 100
Mean Width (m): 2.6
Number of Passes: 1

Conductivity (µmhos): 235
pH: 8.4
Water Temperature (°C): 15.3
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brook Trout	<200 mm	7	7	7	7	269	11.42	70	109	10.20	113	155.6	42.4	1.12
Brook Trout	≥200 mm	1	1	1	1	38	3.27	10	16	2.92	16	200.0	85.0	1.06
Brook Trout	ALL	8	8	8	8	308	14.69	80	125	13.12	129	161.1	47.8	1.11
Creek Chub	ALL	9	9	9	9	346	***	90	140	***	145	41.0	***	***

Site Number: 2 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 1/2 mile above Legion Lake
Legal Description: S25,R5E,T3S
Stream Classification: No Fish Captured

Date Sampled: 20 MAY 2009
Site Length (m): 100
Mean Width (m): 1.4
Number of Passes: 1

Conductivity (µmhos): 247
pH: 7.6
Water Temperature (°C): 15.5
Air Temperature (°C): ****

Appendix S. Population and Biomass Estimates for Little Squaw.

Site Number: 1 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 1/2 mile upstream of Highway 87 (1985 site 1)
Legal Description: S24,R5E,T3S
Stream Classification: No Fish Captured

Date Sampled: 19 MAY 2009
Site Length (m): 100
Mean Width (m): 1.5
Number of Passes: 1

Conductivity (µmhos): 42
pH: 9.0
Water Temperature (°C): 15.8
Air Temperature (°C): ****

Appendix T. Population and Biomass Estimates for Foster Gulch.

Site Number: 1 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: USFS 718 crossing (1984 site 3)
Legal Description: S1,R6E,T2S
Stream Classification: No Fish Captured

Date Sampled: 14 MAY 2009
Site Length (m): 100
Mean Width (m): 4.3
Number of Passes: 1

Conductivity (µmhos): 431
pH: 8.0
Water Temperature (°C): 9.5
Air Temperature (°C): ****

Appendix U. Population and Biomass Estimates for Iron Creek (South).

Site Number: 1 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: Above Camp Remington (Control #1 upper)
Legal Description: S36,R5E,T2S
Stream Classification: BKT0

Date Sampled: 19 MAY 2009
Site Length (m): 100
Mean Width (m): 2.9
Number of Passes: 1

Conductivity (µmhos): 74
pH: 7.6
Water Temperature (°C): 9.9
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brook Trout	<200 mm	54	54	54	54	1,862	39.01	540	754	34.83	869	110.2	21.0	1.08
Brook Trout	ALL	56	56	56	56	1,931	40.46	560	782	36.12	901	110.2	21.0	1.08

Site Number: 4 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 1/4 mile above highway 16A
Legal Description: S28,R6E,T2S
Stream Classification: BKT3

Date Sampled: 18 MAY 2009
Site Length (m): 100
Mean Width (m): 3.6
Number of Passes: 1

Conductivity (µmhos): 78
pH: 7.8
Water Temperature (°C): 15.2
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brook Trout	<200 mm	13	13	13	13	360	11.89	130	146	10.61	209	136.7	33.0	1.19
Brook Trout	≥200 mm	2	2	2	2	55	7.65	20	22	6.83	32	229.5	138.0	1.14
Brook Trout	ALL	15	15	15	15	416	19.95	150	168	17.81	241	149.1	48.0	1.18
Longnose Dace	ALL	53	53	53	53	1,469	***	530	595	***	853	***	***	***

Site Number: 9 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: Below Ninth Bridge
Legal Description: S30,R6E,T2S
Stream Classification: BKT0

Date Sampled: 19 MAY 2009
Site Length (m): 100
Mean Width (m): 3.5
Number of Passes: 1

Conductivity (µmhos): 73
pH: 7.9
Water Temperature (°C): 16.7
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brook Trout	<200 mm	61	61	61	61	1,725	49.62	610	699	44.31	981	130.7	28.8	1.07
Brook Trout	ALL	61	61	61	61	1,725	49.62	610	699	44.31	981	130.7	28.8	1.07
Longnose Dace	ALL	57	57	57	57	1,612	***	570	653	***	917	***	***	***

Appendix V. Population and Biomass Estimates for Iron Creek (South).

Site Number: 10 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 100 M DOWNSTREAM FROM PLAYHOUSE ROAD BRIDGE
Legal Description: S00,R00E,T
Stream Classification:

Date Sampled: 18 MAY 2009
Site Length (m): 100
Mean Width (m): 3.6
Number of Passes: 1

Conductivity (µmhos): 114
pH: 7.8
Water Temperature (°C): 13.5
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Creek Chub	ALL	200	200	200	200	5,570	***	2,000	2,256	***	3,218	***	***	***
Longnose Dace	ALL	15	15	15	15	418	***	150	169	***	241	***	***	***
White Sucker	ALL	37	37	37	37	1,030	***	370	417	***	595	***	***	***

Appendix W. Population and Biomass Estimates for Tepee Gulch.

Site Number: 1 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 1/2 mile above confluence with Battle Creek (1984 site 4)
Legal Description: S34,R6E,T1S
Stream Classification: No Fish Captured

Date Sampled: 14 MAY 2009
Site Length (m): 100
Mean Width (m): 2.5
Number of Passes: 1

Conductivity (µmhos): 588
pH: 7.7
Water Temperature (°C): 10.1
Air Temperature (°C): ****

Appendix X. Population and Biomass Estimates for Grizzly Bear Creek.

Site Number: 1 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: Below Highway 16a (near Grizzly Bear picnic ground) 1984 site 6
Legal Description: S17,R6E,T2S
Stream Classification: BKT0

Date Sampled: 19 MAY 2009
Site Length (m): 100
Mean Width (m): 4.4
Number of Passes: 1

Conductivity (µmhos): 67
pH: 8.0
Water Temperature (°C): 12.3
Air Temperature (°C): 15.0

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brook Trout	<200 mm	6	6	6	6	137	2.37	60	55	2.11	97	121.3	17.3	0.95
Brook Trout	ALL	6	6	6	6	137	2.37	60	55	2.11	97	121.3	17.3	0.95
Creek Chub	ALL	6	6	6	6	137	2.10	60	55	1.88	97	97.0	15.4	1.07
Longnose Dace	ALL	16	16	16	16	364	2.45	160	148	2.18	257	73.0	6.7	1.11

Appendix Y. Population and Biomass Estimates for Pine Creek.

Site Number: 1 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: Above confluence with Battle Creek
Legal Description: S1,R5E,T2S
Stream Classification: No Fish Captured

Date Sampled: 18 MAY 2009
Site Length (m): 100
Mean Width (m): 2.9
Number of Passes: 1

Conductivity (µmhos): 162
pH: 8.6
Water Temperature (°C): 16.0
Air Temperature (°C): ****

Site Number: 2 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 1/2 mile above Horsethief Lake (1984 site 2)
Legal Description: S11,R5E,T2S
Stream Classification: No Fish Captured

Date Sampled: 14 MAY 2009
Site Length (m): 100
Mean Width (m): 2.2
Number of Passes: 1

Conductivity (µmhos): 40
pH: 7.4
Water Temperature (°C): 6.0
Air Temperature (°C): ****

Appendix Z. Population and Biomass Estimates for French Creek.

Site Number: 3 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: Walsh Property
Legal Description: S27,R5E,T3S
Stream Classification: NWT

Date Sampled: 15 JUN 2009
Site Length (m): 100
Mean Width (m): 6.3
Number of Passes: 1

Conductivity (µmhos): 310
pH: 8.4
Water Temperature (°C): 17.7
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Northern Pike	ALL	3	3	3	3	47	***	30	19	***	48	653.0	***	***
Yellow Perch	ALL	1	1	1	1	16	0.52	10	6	0.47	16	145.0	33.0	1.08
Brook Stickleback	ALL	13	13	13	13	206	***	130	83	***	209	***	***	***
Creek Chub	ALL	67	67	67	67	1,060	***	670	429	***	1,078	***	***	***
Fathead Minnow	ALL	5	5	5	5	79	***	50	32	***	80	***	***	***
White Sucker	ALL	47	47	47	47	744	***	470	301	***	756	***	***	***

Population and Biomass Estimates for French Creek. (Continued)

Site Number: 4 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: Waite Property
Legal Description: S33,R5E,T3S
Stream Classification: NWT

Date Sampled: 03 JUN 2009
Site Length (m): 100
Mean Width (m): 4.8
Number of Passes: 1

Conductivity (µmhos): 340
pH: 7.3
Water Temperature (°C): 12.5
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Creek Chub	ALL	139	139	139	139	2,924	282.12	1,390	1,184	251.90	2,237	203.5	96.5	1.13
White Sucker	ALL	21	21	21	21	442	13.69	210	179	12.23	338	140.5	31.0	1.10
Fathead Minnow	ALL	3	3	3	3	63	***	30	26	***	48	***	***	***

Site Number: 5 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: South of Winters Property
Legal Description: S3,R5E,T4S
Stream Classification: BNT3

Date Sampled: 03 JUN 2009
Site Length (m): 100
Mean Width (m): 5.4
Number of Passes: 1

Conductivity (µmhos): 330
pH: 7.4
Water Temperature (°C): 11.3
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brown Trout	<200 mm	2	2	2	2	37	0.81	20	15	0.73	32	85.0	22.0	6.89
Brown Trout	≥200 mm	1	1	1	1	18	1.72	10	7	1.54	16	202.0	93.0	1.13
Brown Trout	ALL	3	3	3	3	55	2.53	30	22	2.26	48	124.0	45.7	4.97
Creek Chub	ALL	160	160	160	160	2,958	***	1,600	1,198	***	2,574	***	***	***
Longnose Dace	ALL	333	333	333	333	6,156	***	3,330	2,493	***	5,358	***	***	***
White Sucker	ALL	36	36	36	36	666	***	360	270	***	579	***	***	***

Population and Biomass Estimates for French Creek. (Continued)

Site Number: 7 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: Above Horse Camp (1984 site 16)
Legal Description: S12,R5E,T4S
Stream Classification: BNT0

Date Sampled: 22 JUN 2009
Site Length (m): 100
Mean Width (m): 7.5
Number of Passes: 1

Conductivity (µmhos): 319
pH: 8.5
Water Temperature (°C): 19.7
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brown Trout	<200 mm	1	1	1	1	13	0.13	10	5	0.12	16	101.0	10.0	0.97
Brown Trout	ALL	1	1	1	1	13	0.13	10	5	0.12	16	101.0	10.0	0.97
Creek Chub	ALL	215	215	215	215	2,860	143.23	2,150	1,158	127.88	3,459	157.5	50.1	1.10
White Sucker	ALL	57	57	57	57	758	48.96	570	307	43.71	917	165.3	64.6	1.02
Fathead Minnow	ALL	57	57	57	57	758	***	570	307	***	917	***	***	***
Longnose Dace	ALL	112	112	112	112	1,490	***	1,120	603	***	1,802	***	***	***

Site Number: 9 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: Below Horse Camp (1984 site 19)
Legal Description: S5,R6E,T4S
Stream Classification: BNT0

Date Sampled: 08 JUN 2009
Site Length (m): 100
Mean Width (m): 7.1
Number of Passes: 1

Conductivity (µmhos): 311
pH: 8.6
Water Temperature (°C): 12.5
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brown Trout	<200 mm	1	1	1	1	14	0.01	10	6	0.01	16	63.0	1.0	0.40
Brown Trout	ALL	1	1	1	1	14	0.01	10	6	0.01	16	63.0	1.0	0.40
Smallmouth Bass	ALL	1	1	1	1	14	0.01	10	6	0.01	16	70.0	1.0	0.29
Creek Chub	ALL	167	167	167	167	2,343	***	1,670	949	***	2,687	***	***	***
Longnose Dace	ALL	31	31	31	31	435	***	310	176	***	499	***	***	***
White Sucker	ALL	61	61	61	61	856	***	610	347	***	981	***	***	***

Population and Biomass Estimates for French Creek. (Continued)

Site Number: 10 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: USGS Gauge 06403300 (1984 site 24)
Legal Description: S11,R6E,T4S
Stream Classification: BKT3 RBT2

Date Sampled: 28 MAY 2009
Site Length (m): 100
Mean Width (m): 10.6
Number of Passes: 1

Conductivity (µmhos): 291
pH: 8.6
Water Temperature (°C): 18.0
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brook Trout	<200 mm	12	12	12	12	113	3.89	120	46	3.47	193	147.0	34.4	1.01
Brook Trout	≥200 mm	2	2	2	2	19	3.30	20	8	2.95	32	252.5	175.5	1.08
Brook Trout	ALL	14	14	14	14	132	7.19	140	53	6.42	225	162.1	54.6	1.02
Rainbow Trout	≥200 mm	1	1	1	1	9	1.39	10	4	1.24	16	262.0	148.0	0.82
Rainbow Trout	ALL	1	1	1	1	9	1.39	10	4	1.24	16	262.0	148.0	0.82
Smallmouth Bass	ALL	1	1	1	1	9	0.62	10	4	0.55	16	170.0	66.0	1.34
White Sucker	ALL	2	2	2	2	19	1.59	20	8	1.42	32	200.5	84.5	1.05

Site Number: 11 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 1984 site 8
Legal Description: S20,R5E,T3S
Stream Classification:

Date Sampled: 26 JUN 2009
Site Length (m): 100
Mean Width (m): 3.3
Number of Passes: 1

Conductivity (µmhos): 542
pH: 8.1
Water Temperature (°C): 18.7
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brook Stickleback	ALL	6	6	6	6	183	***	60	74	***	97	***	***	***
Creek Chub	ALL	30	30	30	30	914	***	300	370	***	483	***	***	***
Fathead Minnow	ALL	6	6	6	6	183	***	60	74	***	97	***	***	***
White Sucker	ALL	8	8	8	8	244	***	80	99	***	129	***	***	***

Population and Biomass Estimates for French Creek. (Continued)

Site Number: 13 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: Upstream of Custer Municipal Pond
Legal Description: S27,R4E,T3S
Stream Classification:

Date Sampled: 26 JUN 2009
Site Length (m): 100
Mean Width (m): 2.6
Number of Passes: 1

Conductivity (µmhos): 450
pH: 7.7
Water Temperature (°C): 17.0
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brook Stickleback	ALL	6	6	6	6	232	***	60	94	***	97	***	***	***
Creek Chub	ALL	3	3	3	3	116	***	30	47	***	48	***	***	***
Fathead Minnow	ALL	6	6	6	6	232	***	60	94	***	97	***	***	***
White Sucker	ALL	11	11	11	11	425	***	110	172	***	177	***	***	***

Appendix AA. Population and Biomass Estimates for Meeker Creek - East Fork.

Site Number: 1 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: Immediately upstream of confluence with west fork of Meeker Creek
Legal Description: S4,R5E,T3S
Stream Classification: NWT

Date Sampled: 21 MAY 2009
Site Length (m): 100
Mean Width (m): 0.8
Number of Passes: 1

Conductivity (µmhos): 85
pH: 7.6
Water Temperature (°C): 8.8
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Creek Chub	ALL	1	1	1	1	121	4.96	10	49	4.43	16	158.0	41.0	1.04
Brook Stickleback	ALL	15	15	15	15	1,813	***	150	734	***	241	***	***	***

Appendix AB. Population and Biomass Estimates for Meeker Creek - West Fork.

Site Number: 1 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: Immediately upstream of confluence with east fork of Meeker Creek
Legal Description: S4,R5E,T3S
Stream Classification: NWT

Date Sampled: 21 MAY 2009
Site Length (m): 100
Mean Width (m): 0.7
Number of Passes: 1

Conductivity (µmhos): 78
pH: 7.5
Water Temperature (°C): 8.8
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Brook Stickleback	ALL	3	3	3	3	418	1.67	30	169	1.49	48	55.7	4.0	0.84
Creek Chub	ALL	2	2	2	2	278	2.23	20	113	1.99	32	88.0	8.0	1.11

Appendix AC. Population and Biomass Estimates for French Creek - South Fork.

Site Number: 1 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: Approximately 250 meters east of a log cabin, just north of fence gate
Legal Description: S23,R3E,T3S
Stream Classification: No Fish Captured

Date Sampled: 02 JUN 2009
Site Length (m): 100
Mean Width (m): 0.9
Number of Passes: 1

Conductivity (µmhos): 661
pH: 8.4
Water Temperature (°C): 8.7
Air Temperature (°C): ****

Appendix AD. Population and Biomass Estimates for Flynn Creek.

Site Number: 1 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: Flynn Creek Cabin area
Legal Description: S24,R5E,T4S
Stream Classification: NWT

Date Sampled: 26 MAY 2009
Site Length (m): 100
Mean Width (m): 2.4
Number of Passes: 1

Conductivity (µmhos): 217
pH: 8.5
Water Temperature (°C): 17.3
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Longnose Dace	ALL	3	3	3	3	126	0.34	30	51	0.30	48	44.3	2.7	3.42

Appendix AE. Population and Biomass Estimates for Lame Johnny Creek - North Fork.

Site Number: 1 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: CSP Road #3 to upper end of watershed
Legal Description: S34,R6E,T4S
Stream Classification: No Fish Captured

Date Sampled: 05 MAY 2009
Site Length (m): ****
Mean Width (m): ****
Number of Passes: 1

Conductivity (µmhos): ****
pH: ****
Water Temperature (°C): ****
Air Temperature (°C): ****

Appendix AF. Population and Biomass Estimates for Lame Johnny Creek - South Fork.

Site Number: 1 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: Intersection of CSP road #1 and #3 upstream
Legal Description: S33,R6E,T4S
Stream Classification:

Date Sampled: 26 MAY 2009
Site Length (m): 100
Mean Width (m): 1.3
Number of Passes: 1

Conductivity (µmhos): 278
pH: 8.4
Water Temperature (°C): 16.1
Air Temperature (°C): ****

Appendix AG. Population and Biomass Estimates for Beaver Creek (Custer Co.).

Site Number: 4 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: Wind Cave National Park downstream from Cold Spring Creek confluence
Legal Description: S25,R5E,T5S
Stream Classification:

Date Sampled: 16 JUN 2009
Site Length (m): 100
Mean Width (m): 2.5
Number of Passes: 1

Conductivity (µmhos): 548
pH: 8.5
Water Temperature (°C): 24.0
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Creek Chub	ALL	56	56	56	56	2,216	***	560	897	***	901	***	***	***
Fathead Minnow	ALL	51	51	51	51	2,018	***	510	817	***	821	***	***	***

Site Number: 6 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: 6
Legal Description: S00,R00E,T
Stream Classification: NWT

Date Sampled: 16 JUN 2009
Site Length (m): 100
Mean Width (m): 1.6
Number of Passes: 1

Conductivity (µmhos): 545
pH: 8.3
Water Temperature (°C): 15.1
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Fathead Minnow	ALL	3	3	3	3	186	***	30	76	***	48	***	***	***

Appendix AH. Population and Biomass Estimates for Highland.

Site Number: 1 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: Above Wind Cave Fence (1985 site 2)
Legal Description: S7,R6E,T5S
Stream Classification: No Fish Captured

Date Sampled: 10 JUN 2008
Site Length (m): 100
Mean Width (m): ****
Number of Passes: 1

Conductivity (µmhos): ****
pH: ****
Water Temperature (°C): ****
Air Temperature (°C): ****

Appendix AI. Population and Biomass Estimates for Cold Spring Creek (Trib. of BV1).

Site Number: 1 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: Wind Cave NP approximately .1 miles downstream of elk exclosure
Legal Description: S35,R5E,T5S
Stream Classification: No Fish Captured

Date Sampled: 16 JUN 2009
Site Length (m): 100
Mean Width (m): ****
Number of Passes: 1

Conductivity (µmhos): 315
pH: 7.6
Water Temperature (°C): 14.0
Air Temperature (°C): ****

Appendix AJ. Population and Biomass Estimates for Hotbrook Canyon.

Site Number: 1 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: First crossing above Evans Plunge (above culvert)
Legal Description: S14,R5E,T7S
Stream Classification:

Date Sampled: 27 MAY 2009
Site Length (m): 100
Mean Width (m): 4.8
Number of Passes: 1

Conductivity (µmhos): 645
pH: 8.5
Water Temperature (°C): 19.4
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Creek Chub	ALL	11	11	11	11	228	***	110	92	***	177	***	***	***
Green Sunfish	ALL	4	4	4	4	83	***	40	34	***	64	***	***	***
Longnose Dace	ALL	72	72	72	72	1,494	***	720	605	***	1,158	***	***	***
Plains Top Minnow	ALL	2	2	2	2	42	***	20	17	***	32	***	***	***
White Sucker	ALL	5	5	5	5	104	***	50	42	***	80	***	***	***
Sandshinner	ALL	19	19	19	19	394	***	190	160	888	306	***	***	***

Site Number: 2 Survey Completed by: South Dakota Game, Fish and Parks
Site Description: Margret Manke Property
Legal Description: S15,R5E,T7S
Stream Classification:

Date Sampled: 27 MAY 2009
Site Length (m): 100
Mean Width (m): 4.2
Number of Passes: 1

Conductivity (µmhos): 659
pH: 8.5
Water Temperature (°C): 23.5
Air Temperature (°C): ****

Species	Size Class	Total Number Captured	Est. # in site	Lower 95% CI	Upper 95% CI	# per hectare	Kg per hectare	# per Km	# per acre	lb. per acre	# per mile	Mean Length (mm)	Mean Weight (grams)	Mean Fulton K-factor
Creek Chub	ALL	1	1	1	1	24	***	10	10	***	16	***	***	***
Fathead Minnow	ALL	1	1	1	1	24	***	10	10	***	16	***	***	***
Green Sunfish	ALL	19	19	19	19	457	***	190	185	***	306	***	***	***
Longnose Dace	ALL	95	95	95	95	2,287	***	950	926	***	1,529	***	***	***
Mountain Sucker	ALL	6	6	6	6	144	***	60	58	***	97	***	***	***

Appendix AK. Population and Biomass Estimates for Cold Brook Canyon Creek.

Site Number: 1	Survey Completed by: South Dakota Game, Fish and Parks	Date Sampled:	17 JUN 2009	Conductivity (µmhos):	****
Site Description: Below Cold Brook Reservoir		Site Length (m):	****	pH:	****
Legal Description: S11,R5E,T7S		Mean Width (m):	****	Water Temperature (°C):	****
Stream Classification: No Fish Captured		Number of Passes:	0	Air Temperature (°C):	****

Appendix AL. Population and Biomass Estimates for Hawkright Creek.

Site Number: 1	Survey Completed by: South Dakota Game, Fish and Parks	Date Sampled:	13 APR 2009	Conductivity (µmhos):	****
Site Description: Above confluence with Pleasant Valley Creek		Site Length (m):	100	pH:	****
Legal Description: S9,R3E,T7S		Mean Width (m):	****	Water Temperature (°C):	****
Stream Classification: No Fish Captured		Number of Passes:	0	Air Temperature (°C):	****

Appendix AM. Population and Biomass Estimates for Pleasant Valley Creek.

Site Number: 2	Survey Completed by: South Dakota Game, Fish and Parks	Date Sampled:	26 MAY 2009	Conductivity (µmhos):	831
Site Description: PVC		Site Length (m):	100	pH:	8.3
Legal Description: S00,R00E,T		Mean Width (m):	3.1	Water Temperature (°C):	21.0
Stream Classification: No Fish Captured		Number of Passes:	1	Air Temperature (°C):	****

Appendix AN. Population and Biomass Estimates for Pass Creek.

Site Number: 1	Survey Completed by: South Dakota Game, Fish and Parks	Date Sampled:	13 APR 2009	Conductivity (µmhos):	****
Site Description: Downstream from Tepee Canyon Confluence		Site Length (m):	****	pH:	****
Legal Description: S12,R1E,T6S		Mean Width (m):	****	Water Temperature (°C):	****
Stream Classification: No Fish Captured		Number of Passes:	0	Air Temperature (°C):	****

Appendix AO. Population and Biomass Estimates for Tepee Canyon.

Site Number: 1	Survey Completed by: South Dakota Game, Fish and Parks	Date Sampled:	13 APR 2009	Conductivity (µmhos):	****
Site Description: At Confluence of Pass Creek		Site Length (m):	****	pH:	****
Legal Description: S12,R1E,T6S		Mean Width (m):	****	Water Temperature (°C):	****
Stream Classification: No Fish Captured		Number of Passes:	0	Air Temperature (°C):	****
Site Number: 2	Survey Completed by: South Dakota Game, Fish and Parks	Date Sampled:	13 APR 2009	Conductivity (µmhos):	****
Site Description: Upstream fo Custer Co. Highway 769		Site Length (m):	****	pH:	****
Legal Description: S14,R1E,T5S		Mean Width (m):	****	Water Temperature (°C):	****
Stream Classification: No Fish Captured		Number of Passes:	0	Air Temperature (°C):	****

Appendix AP. Population and Biomass Estimates for Hell Canyon.

Site Number: 1	Survey Completed by: South Dakota Game, Fish and Parks	Date Sampled:	13 APR 2009	Conductivity (µmhos):	****
Site Description: Upstream of Tepee Canyon Confluence		Site Length (m):	****	pH:	****
Legal Description: S36,R1E,T5S		Mean Width (m):	****	Water Temperature (°C):	****
Stream Classification: No Fish Captured		Number of Passes:	0	Air Temperature (°C):	****

Appendix AQ. Population and Biomass Estimates for West Pass Creek.

Site Number: 1	Survey Completed by: South Dakota Game, Fish and Parks	Date Sampled:	26 MAY 2009	Conductivity (µmhos):	****
Site Description: Downstream from USFS route 273		Site Length (m):	****	pH:	****
Legal Description: S14,R2E,T5S		Mean Width (m):	****	Water Temperature (°C):	****
Stream Classification: No Fish Captured		Number of Passes:	0	Air Temperature (°C):	****

Appendix AR. Population and Biomass Estimates for East Pass Creek.

Site Number: 2	Survey Completed by: South Dakota Game, Fish and Parks	Date Sampled:	26 MAY 2009	Conductivity (µmhos):	****
Site Description: Feeland Well		Site Length (m):	****	pH:	****
Legal Description: S6,R3E,T5S		Mean Width (m):	****	Water Temperature (°C):	****
Stream Classification: No Fish Captured		Number of Passes:	0	Air Temperature (°C):	****