HABITAT CONDITIONS

Channel Alterations

For the most part, there have been no significant channel alterations within the Spring River Tributaries Watershed. Based on comparison of 1971 and 1995 aerial photos of the West Plains area, as well as personal observations, some channel alterations undoubtably have occurred in this area as a result of urban expansion and development. However, it is difficult to estimate the time and extent of channel alterations in this portion of the watershed. Small channelization projects have probably occurred elsewhere on private property and also from road and bridge construction. However, it is difficult to estimate the extent to which this has affected the watershed. Since 1995 there have been fourteen 404 permitted operations within the watershed. Seven of these have involved bridge work (Table Hc01 and Figure Wq02)(USACOE 1999). According to the Missouri Department of Transportation Highway and Bridge Construction Schedule (http://www.modot.state.mo.us/accountability/stip/South_Central_Area.htm), there currently (11/6/98) are 2 state highway projects involving bridge work scheduled within the watershed from 1999-2003 (Table Hc02).

Natural Features

In the late 1980s and early 1990s the Missouri Department of Conservation inventoried counties within the Spring River Tributaries Watershed for unique natural features (Nigh 1988; Ryan and Smith 1991). The inventories recognized seven categories of natural features: examples of undisturbed natural communities, habitat of rare or endangered species, habitat of relict species, outstanding geological formations, areas for nature studies, other unique features, and special aquatic areas having good water quality, flora, and fauna. Since this effort other natural features have been added to what is now the Missouri Natural Heritage Database. Currently the database contains 97 features for the Spring River Tributaries Watershed. These include 13 examples of 8 types of presettlement terrestrial natural communities: Dry-mesic chert prairie-1, Fen-1, Flatwoods-1, Freshwater marsh-1, Pond shrub swamp-4, Prairie fen-3, Wet prairie-1, Wet-mesic prairie-1.

A detailed description of these terrestrial natural communities can be found in The Terrestrial Natural Communities of Missouri by Nelson (1987). Due to the large percentage of privately owned land and thus limited access within the watershed, it is probable that other unknown examples of these terrestrial natural communities exist within the watershed.

Improvement Projects

Currently there is one Missouri Department of Conservation stream habitat improvement project in the Spring River Tributaries Watershed. This project is a cedar tree revetment constructed in 1992 at White Ranch Conservation Area. The purpose of the project is to reduce stream bank erosion on a portion of the South Fork of the Spring River.

Stream Habitat Assessment

Perhaps one of the more difficult attributes of a watershed to attempt to quantify is stream habitat. This is due to the fact that there are several dynamic characteristics which make up stream habitat. To evaluate all of these characteristics individually and accurately for an entire watershed is a monumental task.

Thus, the next best thing is to evaluate a characteristic that has the most impact on all aspects of stream habitat. This is ,arguably, riparian corridor land cover/land use. Riparian corridor land cover/land use has many effects on characteristics stream habitat. These include, but are not limited to water temperature, turbidity, nutrient loading, sand/gravel deposition, instream cover, flow, and channel width and stability. These in turn have effects on still other characteristic of stream habitat such as dissolved oxygen, spawning habitat, etc.

Evaluation of riparian corridor land cover/land use within the Spring River Tributaries Watershed was accomplished using Missouri Resource Assessment Partnership Phase 1 Land Use Data (morapmd.wpd). A buffer zone 3 pixels (90 meters) wide was created which corresponded to a 1:100,000 hydrography coverage for the watershed. This was split into segments no longer than 0.25 miles long(Caldwell, personal communication). Percent land cover/land use for each segment was then calculated. Land cover/land use categories included forest, woodland, grassland, cropland, urban, and water. Percentages of these categories were then calculated for riparian corridors within each of the 12 fourteen digit hydrologic units within the watershed as well as the whole watershed. Results for the entire watershed indicate that corridor land cover/land use consists of slightly more forest/woodland (49.8%) than grassland/cropland (48.1%). Combined percentages for the remaining categories are less than 3% of the total riparian corridor land use in the watershed. The Upper Warm Fork Unit had the highest amount of forested corridor at 55.6 %. While the Upper Howell Creek Unit had the highest percentage of Grassland at 60.1 %. Upper Howell Creek also had the highest percentage of urban land within the corridor at 11.4% (Table Hc03 and Figure Hc01). It is important to note due to the generally impervious nature of the urban landscape, the associated high amount of runoff can increase the tendency of streams to flash flood. It is also important when considering the effects of storm water runoff which can transport many different types of pollutants.

As with many Ozark streams, water temperatures within the Spring River Tributaries Watershed are significantly affected by springs in many places. In an effort to determine the extent of coldwater influence, instantaneous temperature readings were taken at many stream crossings within the watershed during the summers of 1996-1998. In addition, long term temperature monitors (thermographs) were deployed at 11 sites within the watershed in the summer of 1997 and at 14 sites in the summer of 1998. The period of record ranged between 24 and 77 days. The thermographs were programmed to record a water temperature every 2 hours. Data was analyzed based on the percent of 24 hour periods within the period of record that had a minimum temperature of 70 degrees Fahrenheit or less. Four sites had a minimum temperature of 70 degrees Fahrenheit or less for all 24 hour periods in the period of record in both 1997 and 1998. Site B86, which had records for one summer(1998), also had minimum temperatures of 70 degrees Fahrenheit or less for all 24 hour periods within the period of record (Table Hc04, Figures Hc02 and Hc03).

Table Hc01. Operations within the Spring River Tributaries Watershed having 404 Permits since 1995 (USACOE 1999).

Work Type	Permit Date	Stream Name	Linear Feet Affected
Bridge	16 Dec 1998	S. Fork Howell Cr.	425.00
Bridge	24 Jun 1998	S. Fork Howell Cr.	None Given
Bridge Replacement	29 Apr 1997	S. Fork Howell Cr.	None Given
Bridge	12 Feb 1997	S. Fork Howell Cr.	None Given
Bridge Replacement	19 Jan 1996	S. Fork Howell Cr.	None Given
Bridge	22 Sep 1997	Little Greasy Cr.	30.00
Bridge	19 May 1997	Burton Cr.	100.00
Fill	11 Apr 1998	Twomile Cr.	None Given
Gravel Removal	11 Jun 1998	Myatt Cr.	None Given
Pier	31 Jul 1996	Warm Fork	None Given
Pier	31 Jul 1996	Warm Fork	None Given
Utility Line	07 Sep 1995	Howell Cr.	None Given
Utility Line	07 Sep 1995	Howell Cr.	None Given
Utility Line	07 Sep 1995	Howell Cr.	None Given

Note: This table is not a final authority. Status of permits subject to change.

Table Hc02. Missouri Department of Transportation road and bridge construction projects scheduled thru 2003 within the Spring Tributaries Watershed in Missouri (MDT 1999). Name of affected stream given in parenthesis.

Route	Location	Project
Highway 142	1.8 miles and 3.2 miles west of Rte. 17.	Grading, paving, and bridges on 2 disconnected sections. (West Fork and South Fork Spring River).
Route JJ	6.7 and 8.0 miles south of Rte. 160.	Grading, paving, and replace bridges on 2 disconnected sections (Not Given).

Table Hc03. Percent riparian corridor land cover/land use for 14 digit hydrologic units within the Spring River Tributaries Watershed, Missouri. Data is based on MORAP Phase 1 Land Cover (1997). The largest land cover type for each hydrologic unit is given in bold.

Hydrologic Unit	FOR	WDL	GRS	CRP	URB	WAT
Upper Howell	18.8	8.1	60.1	1.5	11.4	0.2
Lower Howell	41.6	10.9	46.4	0.7	0.5	0
Upper Warm Fork	55.6	14.9	29.4	0.1	0	0
Middle Warm Fork	38.3	16.6	40.9	0.3	3.8	0.1
Lower Warm Fork	47.2	19.1	33.5	0	0	0.2
Upper Myatt	34.7	11.3	52.8	1.2	0	<0.1
Lower Myatt	37.0	18.8	43.8	0.4	0	<0.1
Bussel Branch	30.1	11.5	57.8	0.3	0.3	0
West Fork	38.3	12.7	48.3	0.6	0	<0.1
Upper South Fork	40.9	12.0	46.7	0.4	0	<0.1
Lower South Fork	34.8	11.9	52.0	1.2	0	<0.1
Jane's Creek	33.8	9.3	56.5	0.4	0	<0.1
Spring River Tribs (total)	37.3	12.5	47.4	0.7	2.0	<0.1

FOR =Forest, WDL=Woodland, GRS=Grassland, CRP=Cropland, URB=Urban, WAT=Water

Table Hc04. 1997 and 1998 Thermograph data for the Spring River Tributaries Watershed, Missouri (Figures Hc02 and Hc03).

Site	Stream Name	Days	In Date	Out Date	% of 24 hour Periods	Max Hours	Max. Temp.
B1397	Anthony Br.	36	8/11/97	9/18/97	100	0	68.10
B1398	Anthony Br.	77	7/14/98	9/30/98	100	12	74.13
B2397	Warm Fork	36	8/11/97	9/18/97	100	6	71.40
B2398	Warm Fork	69	7/22/98	9/30/98	100	8	73.22
B2998a	Anthony Br.	68	7/23/98	9/30/98	18	526	85.95
B3797	Warm Fork	36	8/11/97	9/18/97	100	36	77.20
B3798	Warm Fork	69	7/22/98	9/30/98	99	38	78.49
B4497	Warm Fork	36	8/11/97	9/18/97	75	186	78.20
B4597	Warm Fork	36	8/11/97	9/18/97	91	64	76.30
B4598	Warm Fork	69	7/22/98	9/30/98	99	36	75.68
B4998	Warm Fork	69	7/22/98	9/30/98	57	210	79.75
B8698	Cox Cr.	77	7/14/98	9/30/98	100	10	73.83
B8897	Warm Fork	35	8/12/97	9/18/97	26	530	83.30
B9698	Unnamed	77	7/14/98	9/30/98	69	166	78.81
C3997a	West Fork	35	8/12/97	9/18/97	46	236	81.30
C3998a	West Fork	77	7/14/98	9/30/98	18	1224	86.62
C4998*	West Fork	0	7/14/98	9/30/98	-	-	-
C7097	Presley Br.	35	8/12/97	9/18/97	97	40	86.30
C7798	Myatt Cr.	77	7/14/98	9/30/98	14	14	83.63
C8197	Hunt Br.	35	8/12/97	9/18/97	51	214	76.30
C8397	Unnamed	35	8/12/97	9/18/97	100	0	65.30
C8398	Unnamed	77	7/14/98	9/30/98	100	6	74.44
C8698	West Fork	77	7/14/98	9/30/98	30	892	84.29
C9797	Bay Cr.	35	8/12/97	9/18/97	100	20	76.90

C9798	**Bay Cr.**	**77**	**7/14/98**	**9/30/98**	**100**	**18**	**75.68**

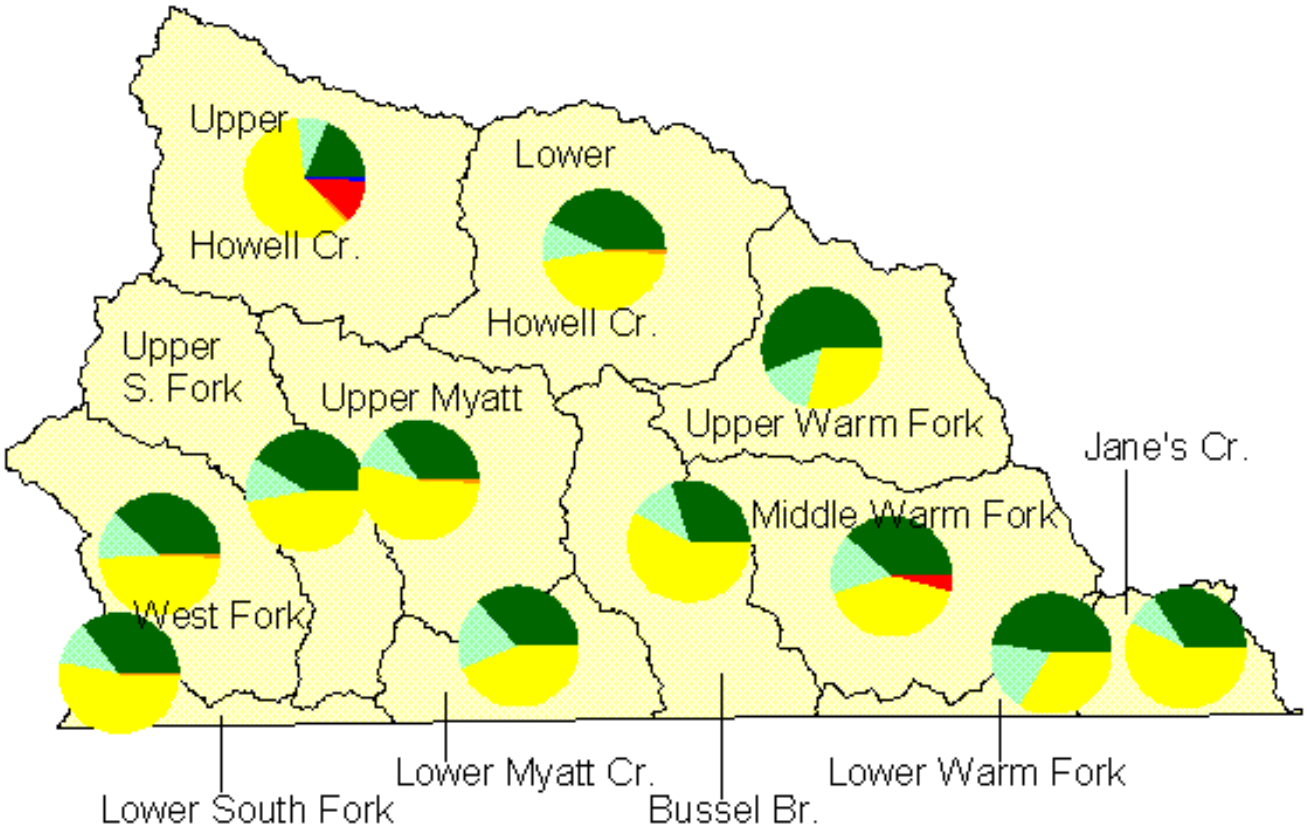
% of 24 Hour Periods= Percent of 24 hour periods with minimum temperature $\leq 70^0$ F.

Max Hours= Maximum number of consecutive hours with temperature > 70^0F

*** Thermograph partially exposed. Data not used.**

Figure Hc01

Spring River Tributaries Watershed
Riparian Corridor Land Cover/Land Use



5 0 5 Miles

Legend

Percent Land Use

- Forest
- Woodland
- Grassland
- Cropland
- Urban
- Water

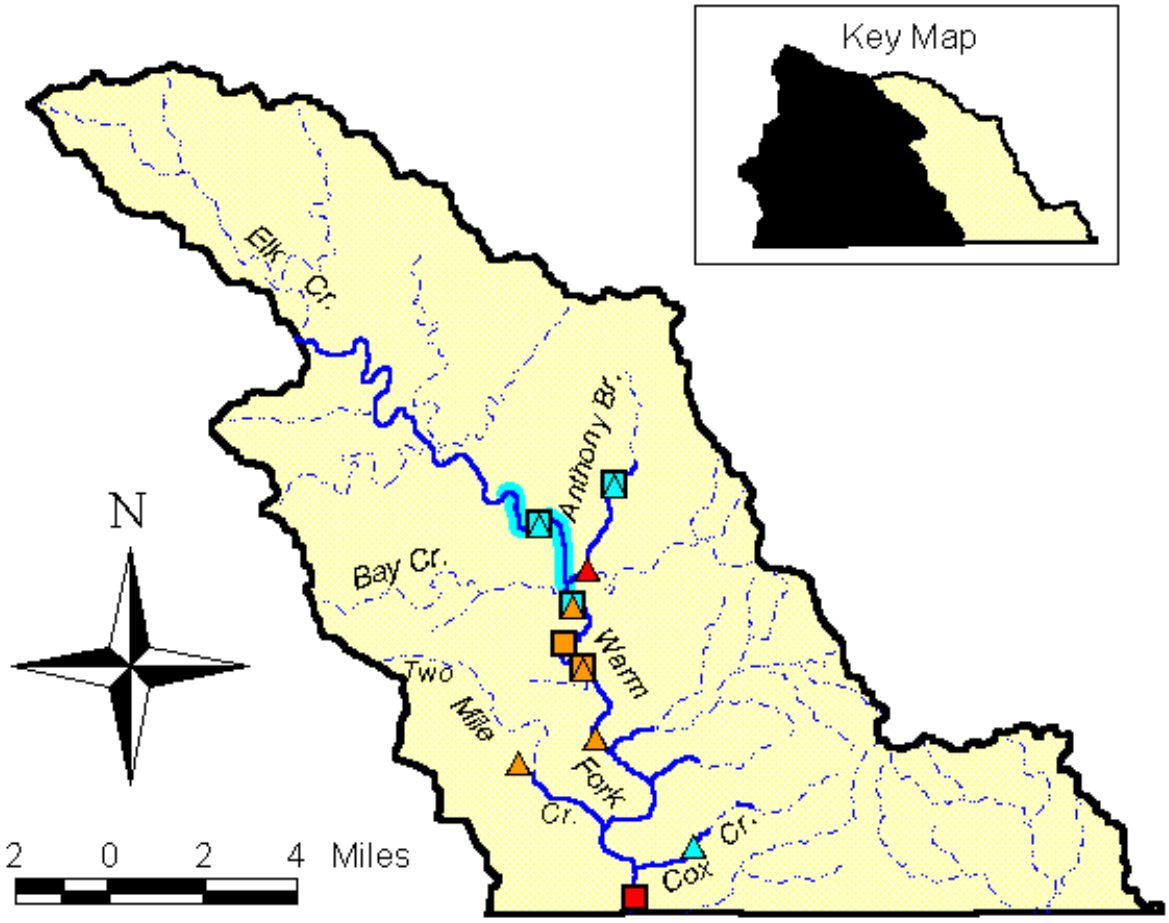
Based on Missouri Resource Assessment Partnership (MoRAP)Phase I Land Cover Map December, 1997 as analyzed by Caldwell (1998)

N

MDC 3/1999

Figure Hc02.

Spring River Tributaries Watershed
East Section Cold-water Habitat



Legend

1997 Thermograph Site*
Period of Record 8/11,12-9/18

- <50
- 50 - 99
- 100

1998 Thermograph Site*
Period of Record 7/14,22,23-9/30

- <50
- 50 - 99
- 100

Designated for Cold-Water Sport Fishery (MDNR 1994b)

*% Period of Record with 24 hr. Minimum Temperature of 70 deg. F. or less.

MDC 3/1999

Figure Hc03.

Spring River Tributaries Watershed
West Section Cold-water Habitat