PASS CREEK

ACME DITCH DIVERSION
CHURCH DITCH DIVERSION
SUMMIT DITCH DIVERSION
TSCHIRGI NO. 2 DITCH DIVERSION

PASS CREEK DRAINAGE
INTRODUCTION

BACKGROUND

Pass Creek flows generally northeast out of the Bighorn Mountains, draining the slope north of Columbus Creek and west of Twin Creek through several tributaries of West and East Pass creeks. Eventually, after they cross the Montana border to the north, West and East Pass creeks become Pass Creek, incorporate Twin Creek, and join the Little Bighorn. The only reservoirs in Wyoming on the Pass Creek drainage lie on the benches below the mountains.

CHARACTERISTICS

Pass Creek's drainage within Wyoming is precipitous for the most part, crossing little irrigable land in the state. Because so little land in Wyoming can be served by the drainage, it supports few major irrigation draws on its flows.

The slope of Pass Creek's channels in Wyoming lend themselves to little loss in Wyoming. In addition, little channel length exists in Wyoming, and West and East Pass Creek are lined with heavy clays, reducing instream losses further. Finally, extensive pressurized (piped) sprinkler usage in larger irrigating operations severely reduces losses in ditches and as a result, also severely reduces return flows.

Pass Creek drainage includes a relatively large number and high volume of reservoirs in the lands below the Bighorn Mountains and south of the Montana border.

USAGE

Pass Creek's diversions are entirely devoted to agricultural irrigation. An 1885 milling appropriation has been inactive since the decline of the wood-cutting activity in the area.

Regulation

The Pass Creek area typically doesn't operate under regulation.

Agriculture

Growers in the Pass Creek drainage tend to devote approximately 50 percent of their lands to alfalfa and 50 percent to grass hay. Their irrigation practices are detailed in the individual diversion memoranda below.

The typical irrigation season runs from April 15-May 1 (depending on whether the spring runoff is delayed by colder weather) to mid-September (depending on when the first snows fall and the ground freezes). Pass Creek drainage irrigators typically don't use post-season irrigation.

Double Appropriation

Irrigation water rights with priority dates of March 1, 1945 or earlier are entitled to an additional 1cfs per 70 acres under Wyoming's surplus water statutes. Whenever the supply in a stream exceeds the amount required to satisfy all existing appropriations established prior to March 1, 1985, the stream is said to be in an excess flow condition and water right holders with priorities between March 2, 1945 and March 1, 1985 may use an additional 1 cfs for each 70 acres irrigated.

In Pass Creek, this practice is limited primarily by the drainage area containing arable lands within Wyoming. Though irrigators could draw twice their allocation, they don't appear to need it for their crops.

Permitted Uses

Permits granted for water appropriation are granted for specific uses. The following pages contain tables of permits and their associated uses. The following table provides a key to those uses:

Code	Use
Chem	Chemical
Com	Commercial
Cul	Culinary
D	Domestic
Drl	Drilling
Eng	Steam Engines
Fire	Fire Protection
Fish	Fish Propogation
F.C.	Flood Control
I	Irrigation
Ind	Industrial
I.F.	Instream Flow
Mech	Mechanical
Mfg	Manufacturing
Mil	Milling

Code	Use
Min	Mining
Misc	Miscellaneous
Mun	Municipal
Oil	Oil Refining or Production
P.C.	Pollution Control
Power	Power Development
R.R.	Railroad
Rec	Recreational
Ref	Refining
Res. Supply	Supply Facility for a Reservoir
S	Stock
T	Transportation

WATER RIGHTS

Two water rights summary tables are provided for each diversion serving irrigation referenced here. The first, included in the body of the diversion synopsis, refers to the rights on record with the State Engineer's Office and is derived from that office's *Tabulation of Adjudicated Surface Water Rights of the State of Wyoming, Water Division Number Two* (Oct. 1999).

Because this rights summary is pulled directly from the SEO *Tab,* the rights cited follow the SEO's priority order:

Hierarchy	Format of right	Example
1	Day, Month, Year	05-15-1884
2	Month and Year	05-00-1884
3	Specified Season and Year	Spring 1884
4	Year Only	1884
5	Before Year	Before 1884

Board orders or court orders may also establish a specific priority.

Irrigated Lands Water Rights Database

The second table, which follows the diversion synopsis, is taken from the irrigated lands water rights database developed for the basin plan. It can be used as a reference with the following caveats: It only lists water rights associated with the irrigated lands polygons mapped by HKM. The table does not include nonirrigation rights devoted to reservoir supply, municipal, fish propagation, etc. The rights on this table are associated only with those irrigated lands identified through the course of this study, both actively irrigated and currently idle.

Column Heading Key

PerNo	Permit Number	"Terr" denotes a territorial right.
PerSfx	Permit Suffix	D = direct flow E = enlargement R = reservoir

Facility Name		Parentheses denote the former means of conveyance for the water right.
Unit	Flow or volume	CFS = cubic feet per second AF = acre-feet GPM = gallons per minute
SupTyp	Supply Type	OS = original supply SS = supplement supply, for lands having an original supply from another source Sec = secondary supply, for water stored in a reservoir
Status	Status of adjudication	Adj = adjudicated Una = unadjudicated
Source	Source water	Parentheses denote the permit number of the related storage right.

KEY DIVERSIONS

Diversion: **ACME DITCH DIVERSION**

Date: 9 May 2001

Notes: Soils along ditch include much clay. Slow, long ditch with essentially only two active users. From reports, maintenance has been a problem and irrigation activity has declined considerably.

Diversion Description: No control structure is evident. The diversion consists of a braided stream channel that diverges, one fork as West Pass Creek, the other as the Acme Ditch. No measurement devices could be found.

Acme Ditch diversion (West Pass Creek begins at the top left of the photo, Acme Ditch begins at the bottom left.)

Diversion Location: The Acme Ditch diversion is located on the North Fork of West Pass Creek, just upstream from the X. X. Ranch. West Pass becomes Pass Creek in Montana, where it also joins the Little Bighorn River and eventually, the Yellowstone River.

Diversion:

Lat.	Long.
N 44° 56' 47.9“	W 107° 31' 16.7"

Conveyance Description: Open channel canal, approximately 11 mi. long.

Direct Flow Water Rights: In recent years, active irrigation has fallen off considerably, to approximately half of the original appropriation.

The summary of direct flow rights follows:

Permit	Priority Date	Permitted Use	Acres	Flow (cfs)	Cumulative (cfs)
Terr.	07-05-1889	I,S	35	0.5	0.50
Terr.	07-05-1889	I,S	100	1.42	1.92
Terr.	07-05-1889	I,S	200	2.84	4.76
5712E	12-09-1953	I	61	0.87	5.68

Associated Storage Rights: No significant storage rights are permitted on the Acme.

Irrigation Practices: In the past 10 years, sprinklers have been removed in favor of 100 percent ditch-flood irrigation.

Return Flows: Estimated percentage of total diversion developing into return flows:

Destination	Wet Yr.	Avg. Yr.	Dry Yr.
West Pass Creek	50	35	20

Losses: 30 percent by end

References:

Dave Hannahs, X Bar X ranch manager, telephone interview, 29 Jan. 2001

Ken Kearns, local landowner, interview, 2 Jan. 2001

Irrigated Lands Water Rights Database

PerNo	PerSfx	Facility Name	Priority	Acres	Amount	Unit	SupTyp	Status	Source
Terr	D	Acme	July 5, 1889	335	4.76	CFS	OS	Adj	West Pass Creek or Cave Creek
5712	E	Enl. Acme	Dec. 9, 1953	61	0.87	CFS	OS	Adj	West Pass Creek or Cave Creek
21336	D	Acme	Dec. 9, 1953	96			SS	Una	Branch (North Fork) West Pass Creek

Name	Acme Ditch Diversion
Source	West Pass Creek
District	6
Data	Total monthly flow in AF

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1970													
1971													
1972													
1973													
1974								0.00	7.44	71.72	68.61	0.00	147.77
1975													
1976													
1977													
1978													
1979													
1980													
1981													
1982													
1983													
1984								38.81	169.46	184.46	182.55	103.07	678.35
1985													
1986								35.70	119.01	100.42	81.31	29.01	365.45
1987								52.31	75.12	0.00	0.00	0.00	127.43
1988													
1989													
1990													
1991													
1992													
1993													
1994													
1995													
1996													
1997								69.36	90.61	41.58	23.95	23.24	248.74
1998								171.32	221.21	149.91	76.61	30.90	649.95
1999								0.00	50.83	81.87	59.31	0.00	192.01
Mean								52.50	104.81	89.99	70.33	26.60	344.24
Max								171.32	221.21	184.46	182.55	103.07	678.35
Min								0.00	7.44	0.00	0.00	0.00	127.43

Notes: 1. Monthly data is derived from spot measurements in the Hydrographers' Annual Reports for years 1980 and later, and from WRDS for years prior to 1980
2. Zero flow is assumed prior to the first and after the last measurement

Name	Acme Ditch Diversion		
Source	West Pass Creek		
District	6		
Data	First & Last Dates, Max. Days		
Water Year	First Date of Measurement	Last Date of Measurement	Maximum Days Missing
1970			
1971			
1972			
1973			
1974	28-Jun	31-Aug	0
1975			
1976			
1977			
1978			
1979			
1980			
1981			
1982			
1983			
1984	23-May	22-Sep	31
1985			
1986	23-May	13-Sep	28
1987	18-May	26-Jun	28
1988			
1989			
1990			
1991			
1992			
1993			
1994			
1995			
1996			
1997	21-May	23-Sep	22
1998	7-May	18-Sep	24
1999	17-Jun	23-Aug	28
Avg.	28-May	31-Aug	23
Earliest	7-May	26-Jun	0
Latest	28-Jun	23-Sep	31

Notes: 1. Data is from Hydrographers' Annual Reports for years 1980 and later, and from WRDS for years prior to 1980.

KEY DIVERSIONS

Diversion: **CHURCH DITCH DIVERSION**

Date: 9 May 2001

Notes: The soil in the Church Ditch's channel is composed of loam from East Pass Creek to Twin Creek, where it becomes clays.

Diversion Description: Headgate consists of a circular steel gate in steel slides operated with a Waterman-type screw in a newly poured concrete headwall. (Diverts through 2-ft. diameter corrugated metal pipe.)

Church Ditch flume

Church Ditch headgate

Diversion Location: The Church Ditch diversion is located on East Pass Creek, just downstream from its confluence with Taffner Creek. East Pass becomes Pass Creek in Montana, where it also joins the Little Bighorn River and eventually, the Yellowstone River.

Headgate:

Lat.	Long.
N 44° 57' 52.3"	W 107° 27' 56.3"

Flume:

Lat.	Long.
N 44° 57' 52.4"	W 107° 27' 52.0"

Conveyance Description: Open channel canal, approx. 6.5 miles long.

Direct Flow Water Rights: The summary of direct flow rights follows:

Permit	Priority Date	Permitted Use	Acres	Flow (cfs)	Cumulative (cfs)
Terr.	08-00-1886	I	714	10.02	10.02
Terr.	-1887	I	5	0.07	10.09

Note: Recent changes in points of use have split the Church Ditch rights up throughout the lands in the Twin Creek Unit of the Sunlight Ranch.

Approximately 40 percent of that acreage (and use) has actually been moved into Montana. Approximately 35 percent remains under the Church Ditch, and 25 percent has been moved to under the Summit Ditch.

Associated Storage Rights: Fills Reynolds No.s 1 and 2 reservoirs

Irrigation Practices: Approximately 70 percent sprinkler, 30 percent ditch-flood irrigation.

Return Flows: Estimated percentage of total diversion developing into return flows:

Destination	Wet yr.	Avg. Yr.	Dry Yr.
East Pass Creek	40	25	10

Losses: Approximately 10 percent by the end of the ditch

References: Ken Kearns, local landowner, HKM Engineering, interview, 2 Jan. 2001

Twin Creek Ranch Irrigation System Rehabilitation, HKM Associates, June 1985

Irrigated Lands Water Rights Database

PerNo	PerSfx	Facility Name	Priority	Acres	Amount	Unit	SupTyp	Status	Source
Terr	D	Church	Aug. 31, 1886	714	10.02	CFS	OS	Adj	East Pass Creek
Terr	D	Church 2nd Appr.	Dec. 31, 1887	5	0.07	CFS	OS	Adj	East Pass Creek

Name	Church Ditch Diversion
Source	East Pass Creek
District	6
Data	Total monthly flow in AF

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1970													
1971													
1972													
1973													
1974								0.00	0.00	38.30	126.09	0.00	164.39
1975													
1976													
1977													
1978													
1979													
1980													
1981													
1982													
1983													
1984								0.00	24.24	225.67	244.04	146.71	640.66
1985													
1986								0.00	0.00	140.78	112.11	0.00	252.89
1987													
1988													
1989													
1990													
1991													
1992													
1993								0.00	0.00	0.00	11.54	84.68	96.22
1994													
1995													
1996													
1997								0.00	41.86	127.47	189.87	186.02	545.22
1998								140.99					
1999								0.00	0.00	41.22	227.83	0.00	269.05
Mean								20.14	11.02	95.57	151.91	69.57	328.07
Max								140.99	41.86	225.67	244.04	186.02	640.66
Min								0.00	0.00	0.00	11.54	0.00	96.22

Notes: 1. Monthly data is derived from spot measurements in the Hydrographers' Annual Reports for years 1980 and later, and from WRDS for years prior to 1980
2. Zero flow is assumed prior to the first and after the last measurement

Name	Church Ditch Diversion		
Source	East Pass Creek		
District	6		
Data	First & Last Dates, Max. Days		
Water Year	First Date of Measurement	Last Date of Measurement	Maximum Days Missing
1970			
1971			
1972			
1973			
1974	29-Jul	31-Aug	0
1975			
1976			
1977			
1978			
1979			
1980			
1981			
1982			
1983			
1984	27-Jun	22-Sep	31
1985			
1986	12-Jul	20-Aug	23
1987	One Reading	One Reading	One Reading
1988			
1989			
1990			
1991			
1992			
1993	27-Aug	28-Sep	32
1994			
1995			
1996			
1997	3-Jun	16-Sep	36
1998	11-May	15-Sep	91
1999	15-Jul	23-Aug	12
Avg.	4-Jul	8-Sep	32
Earliest	11-May	20-Aug	0
Latest	27-Aug	28-Sep	91

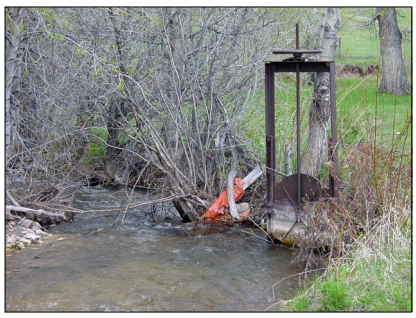
Notes: 1. Data is from Hydrographers' Annual Reports for years 1980 and later, and from WRDS for years prior to 1980.

KEY DIVERSIONS

Diversion: **SUMMIT DITCH DIVERSION**

Date: 9 May 2001

Note: The Parshall flume used to measure flows through this ditch appears to be in poor condition and is actually being bypassed by much of the flow.



Summit Ditch headgate

Diversion Description: Headgate consists of a circular steel gate in steel slides operated with a Waterman-type screw. (Diverts through 2-ft. diameter corrugated metal pipe.)

Diversion Location: The Summit Ditch diversion is located on East Pass Creek, just downstream from the Church Ditch diversion. East Pass becomes Pass Creek in Montana, where it also joins the Little Bighorn River and eventually, the Yellowstone River.

Summit Ditch flume

Headgate:

Lat.	Long.
N 44° 58' 38.4‘‘	W 107° 26' 52.0"

Flume:

Lat.	Long.
N 44° 58' 39.4‘‘	W 107° 26' 47.6"

Conveyance Description: Open channel canal, approx. 33 mi. long (inside Wyoming)

Direct Flow Water Rights: The summary of direct flow rights follows:

Permit	Priority Date	Permitted Use	Acres	Flow (cfs)	Cumulative (cfs)
Terr.	03-00-1887	I	25	0.36	0.36
Terr.	04-01-1887	I	15	0.21	0.57
Terr.	04-01-1887	I	25	0.36	0.93
Terr.	04-01-1887	I	30	0.43	1.36
Terr.	04-01-1887	I	40	0.57	1.93
Terr.	04-01-1887	I	70	1.00	2.93
Terr.	04-01-1887	I	75	1.00	3.93
Terr.	04-01-1887	I	75	1.00	4.93
Terr.	04-01-1887	I	90	1.29	6.22

Associated Storage Rights: No significant storage rights are permitted on the Summit.

Irrigation Practices: 100 percent ditch-flood

Return Flows: Estimated percentage of total diversion developing into return flows:

Destination	Wet Yr.	Avg Yr.	Dry Yr.
West Pass Creek	50	35	20

Losses: 30 percent by end

References: Ken Kearns, local landowner, HKM Engineering, interview, 2 Jan. 2001

Twin Creek Ranch Irrigation System Rehabilitation, HKM Associates, June 1985

Irrigated Lands Water Rights Database

PerNo	PerSfx	Facility Name	Priority	Acres	Amount	Unit	SupTyp	Status	Source
Terr	D	Summit (Denius Sprinkler System)	March 31, 1887	445	7.22	CFS	OS	Adj	East Pass Creek
Terr	D	Summit (Denius Sprinkler System)	April 1, 1887	445	7.22	CFS	OS	Adj	East Pass Creek

Name	Summit Ditch Diversion
Source	East Pass Creek
District	6
Data	Total monthly flow in AF

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1970													
1971													
1972													
1973													
1974								0.00	1.77	15.93	26.68	0.00	44.38
1975													
1976													
1977													
1978													
1979													
1980													
1981													
1982													
1983													
1984													
1985													
1986													
1987													
1988													
1989													
1990													
1991													
1992													
1993													
1994													
1995													
1996													
1997								0.00	70.33	203.89	155.91	96.83	526.96
1998								102.70	149.95	130.89	166.26	75.17	624.97
1999								0.00	23.70	50.78	38.48	0.00	112.96
Mean								25.68	61.44	100.37	96.83	43.00	327.32
Max								102.70	149.95	203.89	166.26	96.83	624.97
Min								0.00	1.77	15.93	26.68	0.00	44.38

Notes: 1. Monthly data is derived from spot measurements in the Hydrographers' Annual Reports for years 1980 and later, and from WRDS for years prior to 1980
2. Zero flow is assumed prior to the first and after the last measurement

Name	Summit Ditch Diversion		
Source	East Pass Creek		
District	6		
Data	First & Last Dates, Max. Days		
Water Year	First Date of Measurement	Last Date of Measurement	Maximum Days Missing
1970			
1971			
1972			
1973			
1974	28-Jun	31-Aug	0
1975			
1976			
1977			
1978			
1979			
1980			
1981			
1982			
1983			
1984			
1985			
1986			
1987			
1988			
1989			
1990			
1991			
1992			
1993			
1994			
1995			
1996			
1997	3-Jun	23-Sep	42
1998	5-May	15-Sep	22
1999	17-Jun	23-Aug	28
Avg.	5-Jun	7-Sep	23
Earliest	5-May	23-Aug	0
Latest	28-Jun	23-Sep	42

Notes: 1. Data is from Hydrographers' Annual Reports for years 1980 and later, and from WRDS for years prior to 1980.

KEY DIVERSIONS

Diversion: **TSCHIRGI NO. 2 DITCH DIVERSION**

Date: 29 Jan 2001

Diversion Description: Now a pumping diversion.

Diversion Location: The Tschirgi No. 2 Ditch diversion is located on West Pass Creek. West Pass becomes Pass Creek in Montana, where it also joins the Little Bighorn River and eventually, the Yellowstone River.

Conveyance Description: Pressurized pipeline.

Direct Flow Water Rights: The summary for direct flow rights follows:

Permit	Priority Date	Permitted Use	Acres	Flow (cfs)	Cumulative (cfs)
91	07-06-1891	I,S	35	0.50	0.50
973E	01-26-1903	I	147	2.10	2.60
973E	01-26-1903	I	159	2.27	4.87
973E	01-26-1903	I	338	4.82	9.69

Note: Current irrigators note that pumping rates have tapped approximately 4 cfs of the right in the past few years, but that plans to open the Tschirgi No. 2 ditch again and install new pumps mean increases in use of right.

Associated Storage Rights: None

Irrigation Practices: Approximately 5 percent of irrigation is done by "big gun," single-head sprinklers, 5 percent by hand-line sprinklers, 50 percent by sideroll, and the remaining 40 percent is done with gated pipe.

Return Flows: Estimated percentage of total diversion developing into return flows:

Destination	Wet Yr.	Avg. Yr.	Dry Yr.
West Pass Creek	25	20	10

Losses: None (Pumping diversions have no conveyance losses.)

References: Ken Kearns, local landowner, interview, 2 Jan. 20

Paula Luschen, owner, and Hal Iverson, ranch manager, West Pass Creek Ranch, telephone interview, 31 Jan. 2001

Irrigated Lands Water Rights Database

PerNo	PerSfx	Facility Name	Priority	Acres	Amount	Unit	SupTyp	Status	Source
973	E	Enl. Tschirgi No. 2 (Nicholson West Pass Pump)	Jan. 26, 1903	644	9.19	CFS	OS	Adj	West Pass Creek