

Red Clover and Last Chance Creeks Stream Flow Monitoring Report



Red Clover Creek, May 2012

**Feather River Coordinated Resource Management
Plumas Corporation
March 2013**

This report displays stream flow data collected by the Feather River Coordinated Resource Management group (FRCRM) on Red Clover and Last Chance creeks. This report attempts to display all stream flow data collected on Red Clover and Last Chance creeks to date. Flow data are displayed in tabular and chart format. **There are no conclusions drawn from the data in this report.** Further analysis and discussion of the Red Clover data is available in the Red Clover McReynolds Monitoring Reports from 2007-2010. These reports are available on the FRCRM website under the Red Clover McReynolds project tab.

Included in the tables with the FRCRM stream flow data are data from the California Department of Water Resources (DWR) stream flow monitoring station on Indian Creek below Indian Falls (ICR). These data are provided to show the relationship between the Red Clover and Last Chance creeks stream flows and the stream flow coming out of Indian Valley. ICR is a continuous recording station. Data included in the tables from ICR is from 12:00 pm. Available stream flow data from ICR starts in 2007. All stream flow data are displayed with a map of locations where the data were collected as well a monthly summary of precipitation totals from that year. The purpose of the precipitation summary chart is to show the magnitude and distribution of precipitation throughout the water year. Precipitation data are taken from nearby DWR weather stations in Thompson Valley and Doyle Crossing. The Thompson Valley station, the closest station to Red Clover Valley, started collecting data in mid-December 2006. Precipitation totals previous to December 2006 are from the Doyle Crossing weather station. Percent average precipitation data for the Last Chance watershed are taken from the DWR Granite Springs climate station. Percent average precipitation data for the Red Clover watershed are taken from the DWR Clover Valley climate station. These stations have been in operation for 44 and 47 years, respectively. Please see location maps on page 4 and 21 for the locations of these climate stations. See Table 1 for yearly precipitation totals from the Doyle Crossing and Thompson Valley stations as well as the percent average precipitation from the Granite Springs and Clover Valley climate stations.

Keep in mind while reading this report that each measurement has error associated with it. Error that is present during a stream flow measurement includes current meter accuracy (the closeness of agreement between a measured value and the true value) and measurement accuracy which is affected by the observer and calculation of total velocity (Velocity is measured at a minimum of 25 locations along a cross-section of the stream. Each of these 25 velocity locations is assumed to represent the average velocity for that section of stream and the total flow is calculated by summing the flows from all 25 sections. The width, depth, and velocity measurements at each of the 25 stations have some error associated with them). Low flow measurements have the most error associated with each measurement. Stream flows in this report are measured using a Marsh-McBirney (MMB) 2000 current meter.

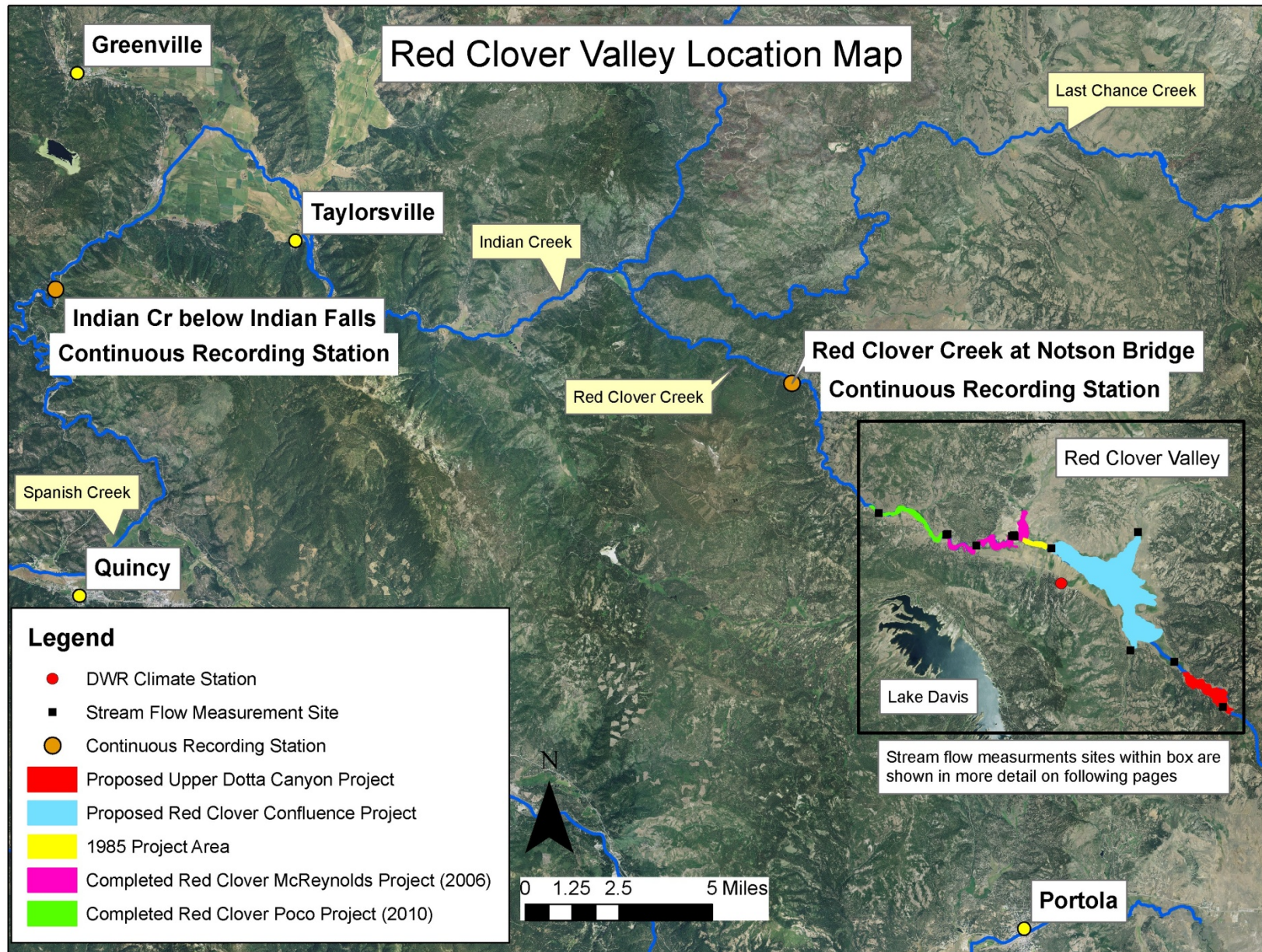
At the test velocity of 0.25 feet per second the MMB had a standard deviation of 21% of velocity error (Fulford, 2004). In this report measurements with cubic feet per second (cfs) values less than 0.1 cfs are recorded at <0.1 cfs. Percent change in stream flow is not calculated for values of less than 0.1 cfs.

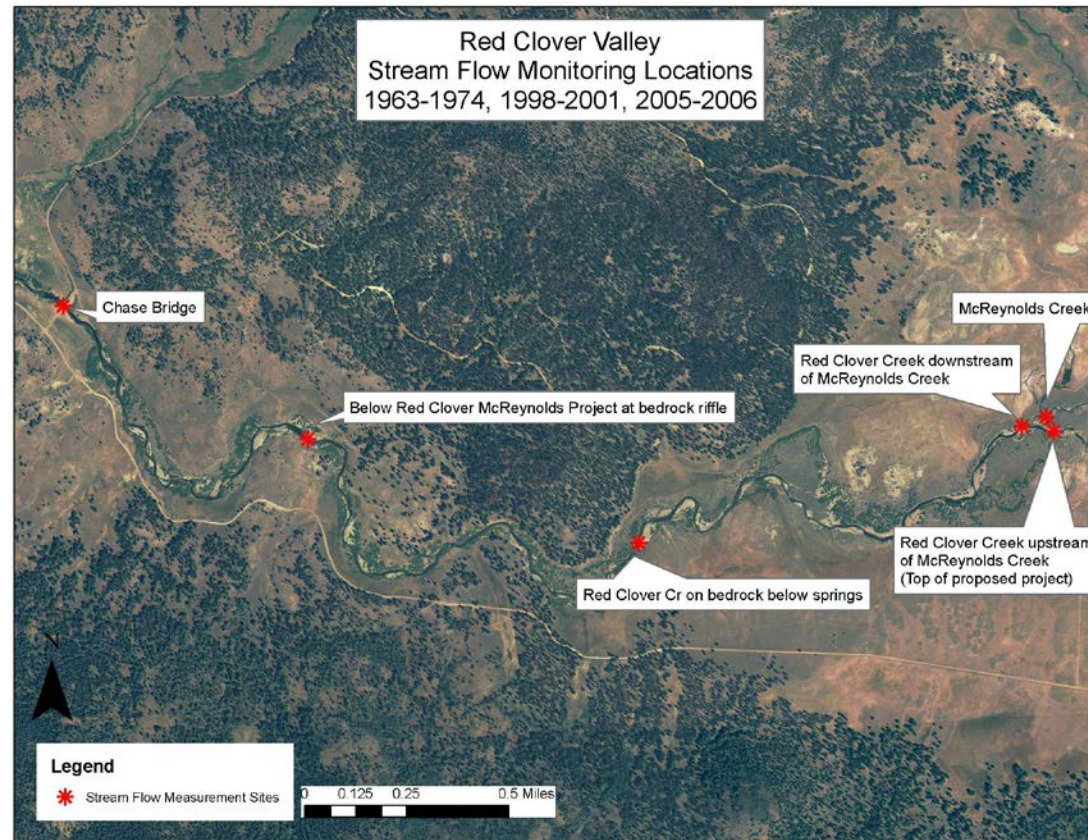
Table 1: Water Year Precipitation Totals				
	% Avg Precip at Granite Springs	Doyle Crossing (in)	% Avg Precip at Clover Valley	Thompson Valley (in)
2012	60%	10.71	72%	13.61
2011	140%	22.41	148%	31.86
2010	87%	14.55	99%	28.78
2009	112%	17.11	112%	21.84
2008	73%	11.49	73%	11.82
2007	67%	9.02	68%	11.29
2006	38%	35.07	150%	Not in operation
2005	72%	14.56	34%	Not in operation

Precipitation is displayed in water year (October 1- September 30). Stream flow data are discussed in calendar year (January 1- December 31). All stream flow data is displayed in cubic feet per second (cfs).

Red Clover Creek

Stream flow monitoring on Red Clover Creek in Red Clover Valley was initiated by the US Forest Service in 1963-1974 at Chase Bridge. The Forest Service recommenced stream flow monitoring at Chase Bridge from 1998-2001. California Department of Water Resources also had a continuous stream flow monitoring site at Chase Bridge from 1964-1966 and 1969-1975. The Feather River Coordinated Resource Management group (FRCRM) initiated stream flow monitoring in Red Clover Valley associated with meadow restoration projects in 2005. The results from these monitoring efforts are displayed in tables below. Tables also show percent change in stream flow from the top of the Red Clover McReynolds project to the bottom of the Red Clover McReynolds project. In 2011 and 2012 tables also display percent change in stream flow from the top of the Red Clover McReynolds project to the bottom of the Red Clover Poco project. Stream flow monitoring maps may show more than one year's monitoring stations.





Forest Service: 1998-2001

The stream flow monitoring initiated by the US Forest Service is summarized in the Red Clover Creek Watershed Assessment. Low flow measurements below Chase Bridge were initiated in 1998. The lowest flows measured in 1998, 1999, 2000, and 2001 were 3.1, 2.6, 0.4, and 0.3 cfs respectively (U.S. Forest Service, 2006).

Department of Water Resources: 1964-1966 & 1969-1975

The California Department of Water Resources maintained a continuous recording station on Red Clover Creek at Chase Bridge to determine the feasibility of a dam downstream from this site. The station was called Red Clover Creek above Abbey Bridge Damsite.

The data was summarized in the Red Clover Creek Watershed Assessment (2006): The average minimum flow from mid-June to mid-September at Chase Bridge was 2.2 cubic feet per second (cfs) for the ten-year period with daily values ranging from <0.1 to 81 cfs. The lowest flows generally occur from August to mid-September. From mid-June to mid-September at Chase Bridge, stream flow is below 1 cfs 20 percent of the time. The seven-day minimum summer flow at Chase Bridge ranged from <0.1 to 2.1 cfs from 1964-1974 with an average of 1.2 cfs (U.S. Forest Service, 2006). The following table summarizes this data.

Table 2: Red Clover Creek above Abbey Bridge Damsite Stream Flow (cfs)- 1964-1966, 1969-1975							
Water Year	Daily Mean Discharge					% summer days below 1 cfs	Total Acre Feet (water year total)
	Mean	Max	Date of Max Flow	Min Summer Flow	Date of Min Summer Flow		
1975	71.1	780	5/3	1.7	9/8	0	51439
1974	77.1	1070	3/30	0.9	8/27	1	55832
1973	*	280	4/6	*		*	*
1972	29.1	504	3/3	0.8	9/10 & 9/14	2	21158
1971	91.4	1150	3/26	1.9	9/16	0	66146
1970	62.8	1500	1/24	0	7/21-8/5	60	45496
1969	111	1500	1/20	0.1	8/24-8/25	50	80372
1966	22.6	360	3/14	0.6	8/26	20	16380
1965	116	782	4/21	1.3	8/9	0	84000
1964	27.4	411	4/10	0.8	8/7 & 8/22	8	19920

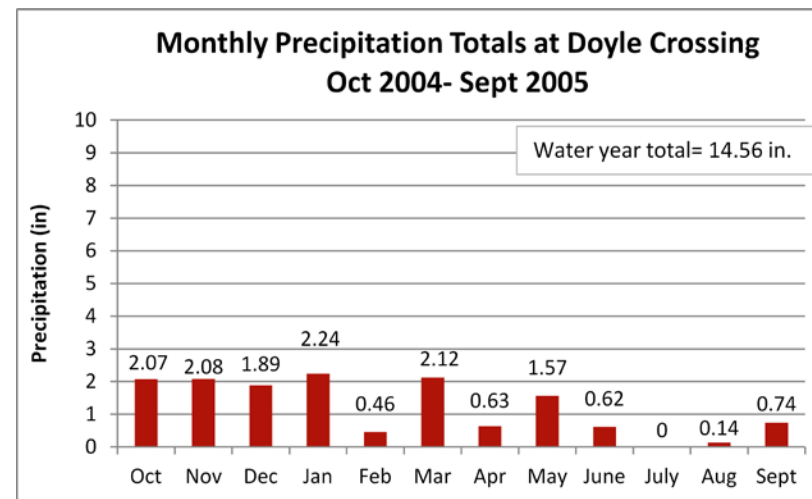
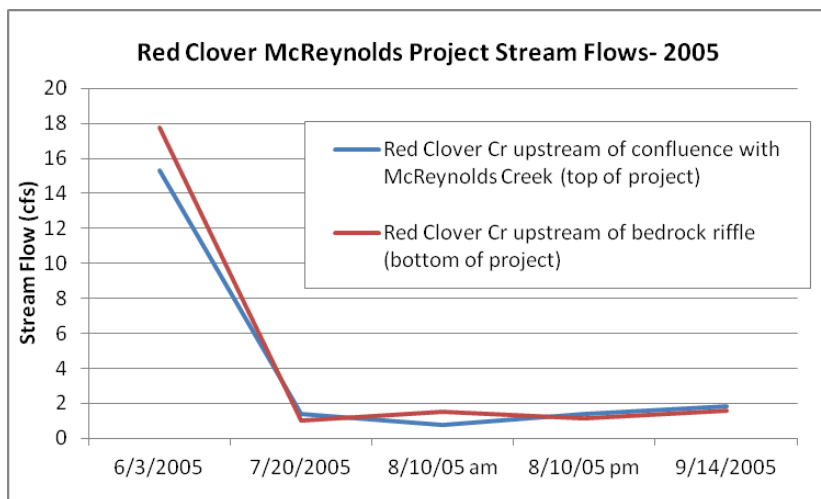
* Computer failure from 7/3 - 9/18

2005

In 2005 stream flow measurement sites were established above, within, and below the Red Clover McReynolds Meadow Restoration Project area. Stream flows were measured at these sites once a month prior to construction in 2006. No continuous stream flow data is available in Red Clover Valley. The closest continuous recording station to Red Clover Valley is on Red Clover Creek at Notson Bridge, approximately 10 miles downstream from the top of the Red Clover McReynolds Project area. Table 2 displays pre-project stream flow data collected in 2005.

Table 3: Red Clover McReynolds Project Stream Flows (cfs)- 2005

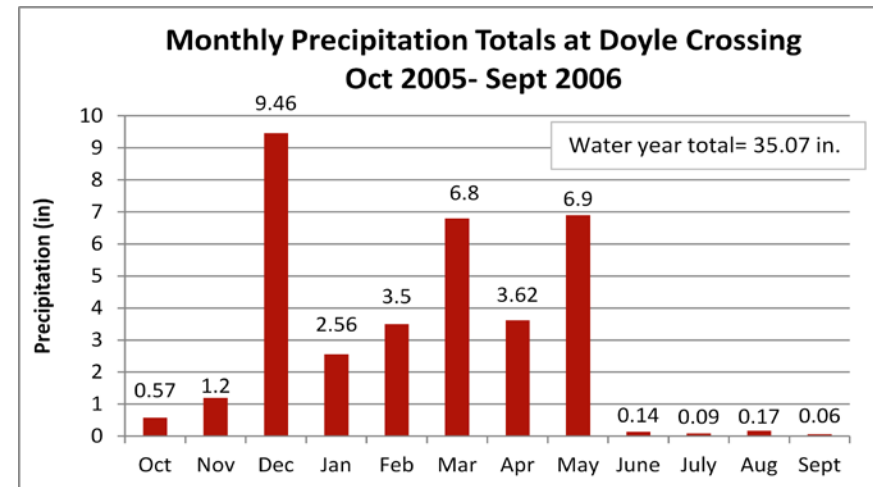
Date	Upstream of confluence with McReynolds Creek (top of project)	McReynolds Creek	Downstream of confluence with McReynolds Creek	Red Clover Cr on bedrock below springs	Red Clover Cr upstream of bedrock riffle (bottom of project)	% change in stream flow from top to bottom of McReynolds project	Notson Bridge	Flournoy Bridge
6/3/2005	15.3	<0.1	15.1	15.8	17.8	16	44.4	236
7/20/2005	1.4				1.0	-29	5.0	Data recorder error
8/10/05 am	0.8		1.2	1.1	1.5	88	5.9	
8/10/05 pm	1.4				1.1	-21	3.4	
9/14/2005	1.9				1.6	-16	5.6	

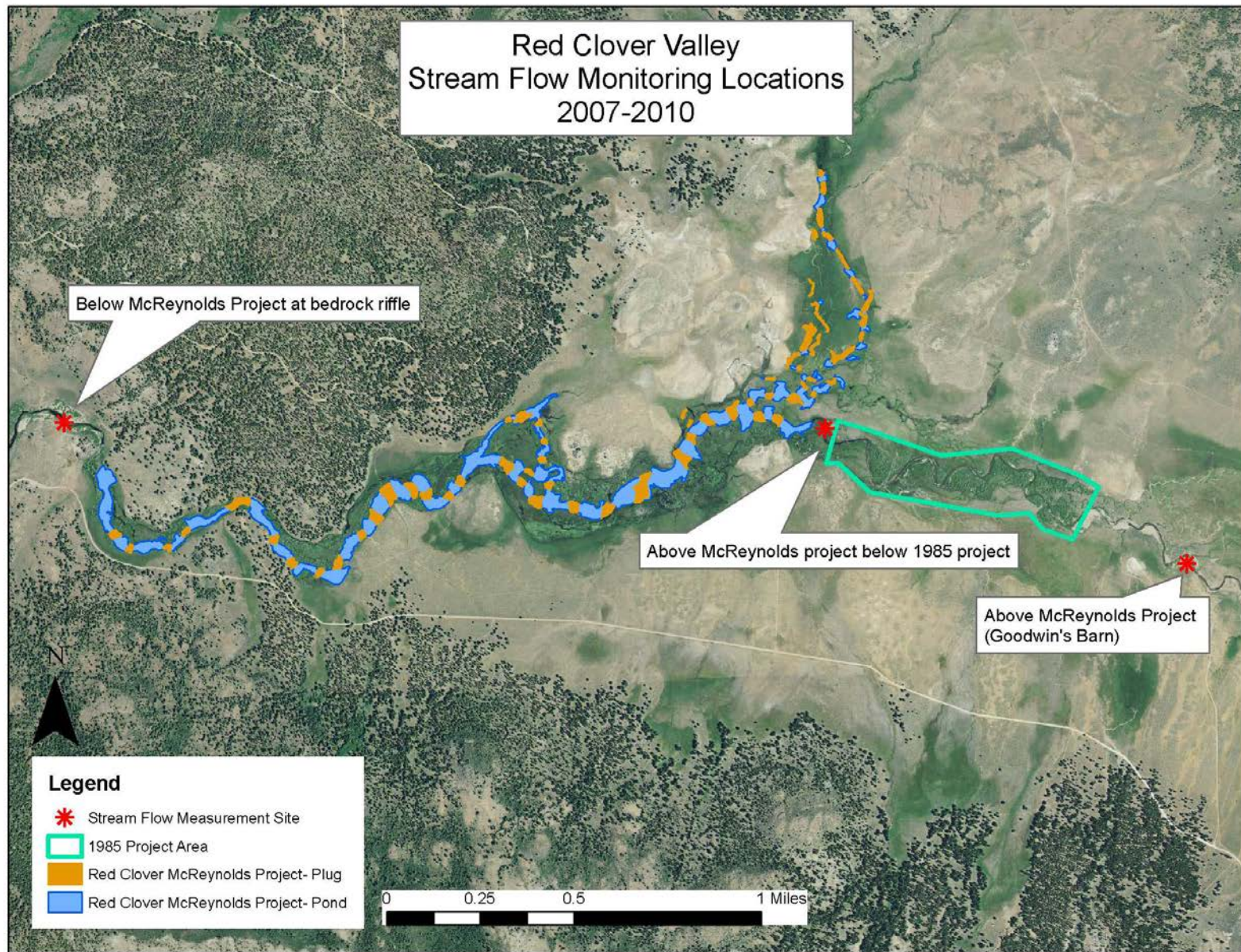


2006

In 2006 the Red Clover McReynolds Meadow Restoration Project was constructed. In 2006 stream flow was only measured once just before project construction commenced.

Table 4: Red Clover McReynolds Project Stream Flows (cfs)- 2006			
Date	Above confluence with McReynolds Creek (top of project)	Notson Bridge	Flournoy Bridge
8/8/2006	1.1	3.7	Data recorder error

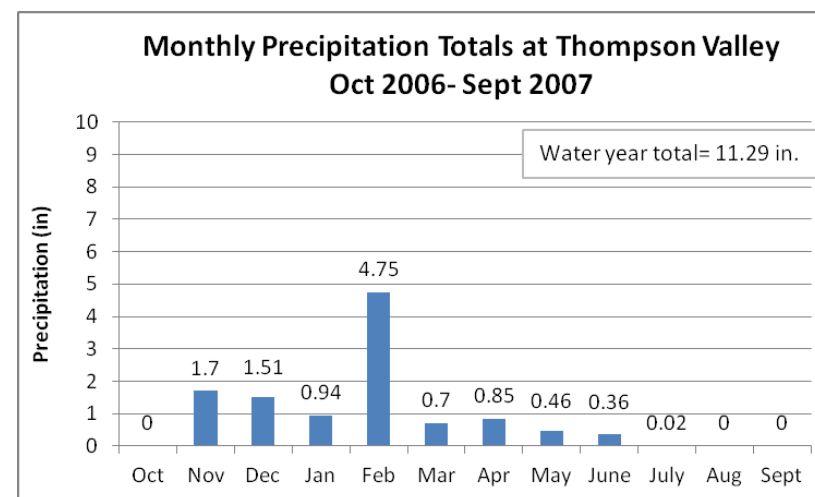
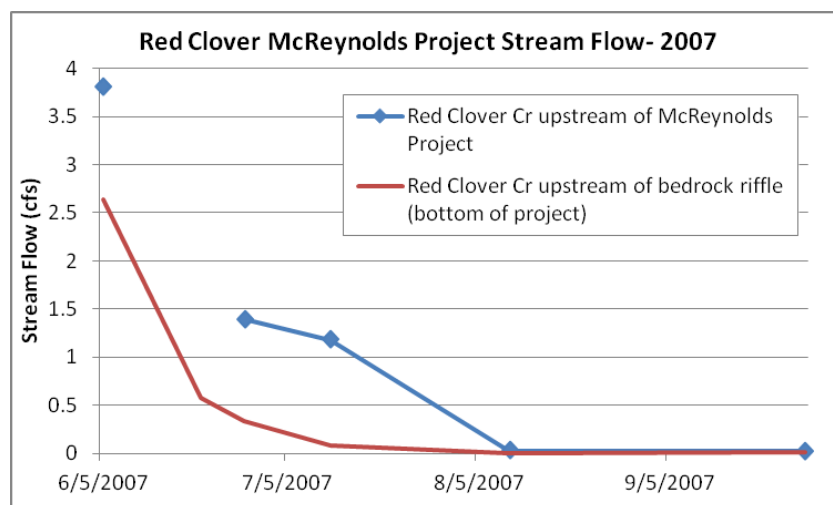




2007

2007 was the first year of post-project stream flow monitoring for the Red Clover McReynolds project. The station above the McReynolds project was moved upstream ¼ mile in 2007. The station below the Red Clover McReynolds project was the same as in 2005.

Date	Upstream of McReynolds project and below 1985 project	Red Clover Cr upstream of bedrock riffle (bottom of project)	% Change in stream flow from top to bottom of McReynolds project	Notson Bridge	Flournoy Bridge	Indian Creek below Indian Falls
6/5/2007	3.8	2.6	-32	2.9	Data recorder error	60
6/21/2007	Not measured	0.6	n/a	2.5		37
6/28/2007	1.4	0.3	-79	2.0		29
7/12/2007	1.2	<0.1	n/a	1.5		26
8/10/2007	<0.1	<0.1	n/a	2.3	25.0	20
9/27/2007	<0.1	<0.1	n/a	5.4	26.3	27



2008

In 2008 the stream flow measurement above the Red Clover McReynolds Project was moved further upstream to above the 1985 check dam project at the Goodwin Ranch barn and corrals. The monitoring station was moved due to beaver interfering with the measurement site. The measurement site below the project was not moved. Stream flow was measured weekly from June through September 2008 compared to monthly in previous years. Notson Bridge continuous recording station had a computer failure in 2008. Stream flow data is only available at Notson Bridge from monthly stream flow measurements rather than continuously. See table on page 12.

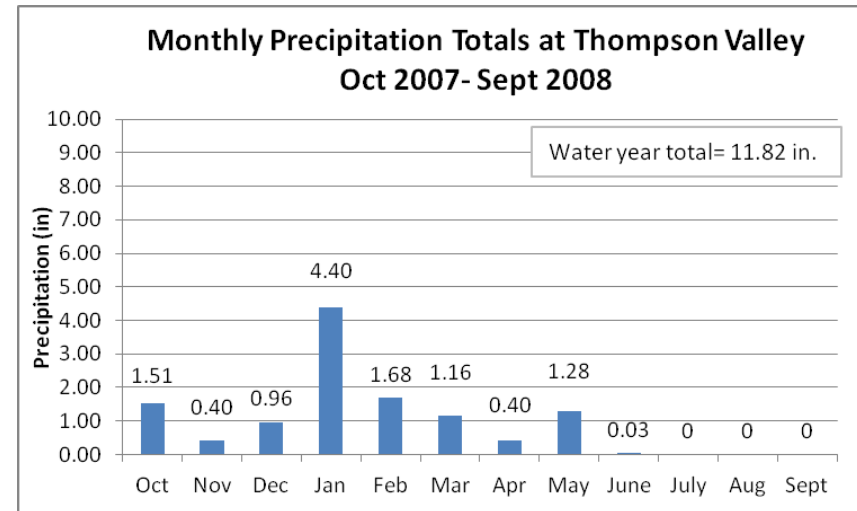
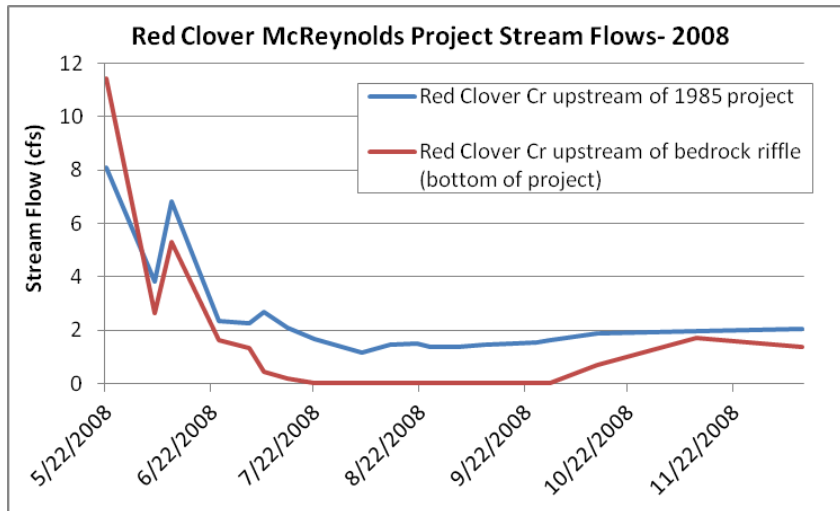
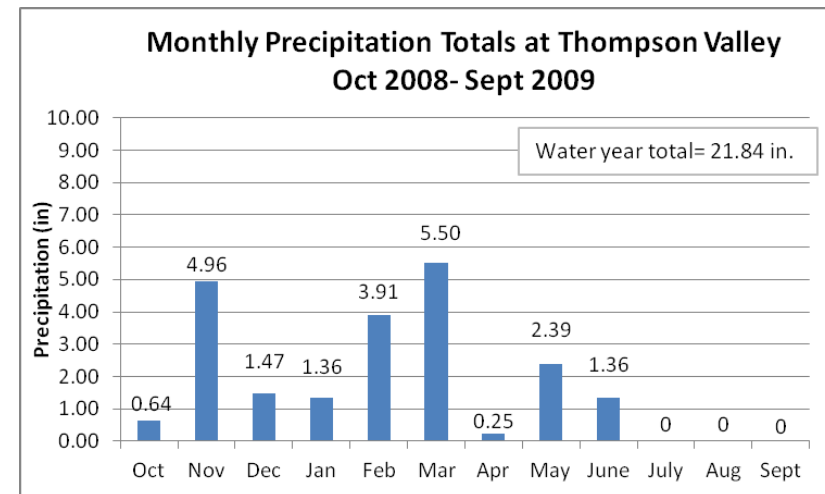
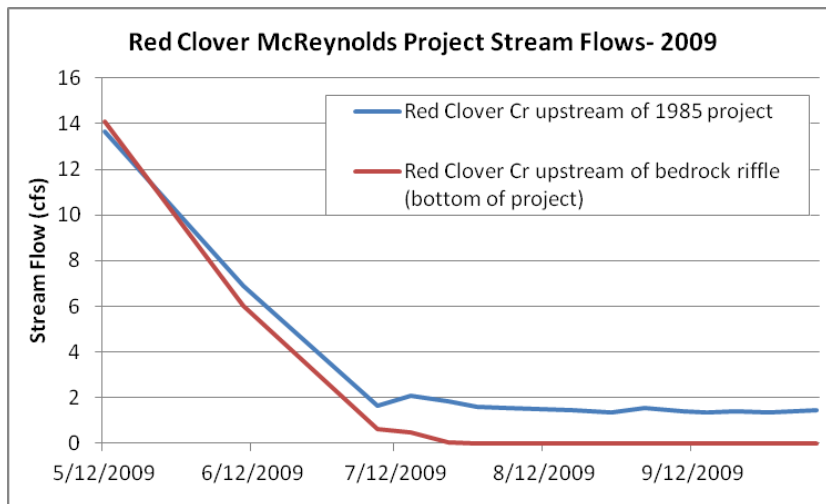


Table 6: Red Clover McReynolds Project Stream Flows (cfs)- 2008						
Date	Upstream of McReynolds and 1985 projects (Goodwin's Barn)	Red Clover Cr upstream of bedrock riffle (bottom of McReynolds project)	% change in stream flow from top to bottom of McReynolds project	Notson Bridge	Flournoy Bridge	Indian Creek below Indian Falls
5/22/2008	8.1	11.4	41		54.9	189
6/5/2008	3.8	2.6	-32		44.0	104
6/10/2008	6.8	5.3	-22	10.6	34.6	79
6/24/2008	2.4	1.6	-33		24.2	44
7/3/2008	2.3	1.3	-44		20.6	25
7/7/2008	2.7	0.4	-85	2.8	19.4	19
7/14/2008	2.1	0.2	-91		18.0	17
7/22/2008	1.7	<0.1	n/a		17.4	15
8/5/2008	1.2	<0.1	n/a		16.2	12
8/13/2008	1.4	<0.1	n/a	2.3	15.4	11
8/21/2008	1.5	<0.1	n/a		15.8	8.8
8/25/2008	1.4	<0.1	n/a		15.3	3.7
9/2/2008	1.4	<0.1	n/a		16.3	4.8
9/10/2008	1.5	<0.1	n/a	2.0	16.2	9.1
9/18/2008	1.5	<0.1	n/a		16.1	6.8
9/25/2008	1.6	<0.1	n/a		17.6	12
9/29/2008	1.6	<0.1	n/a		17.6	11
10/13/2008	1.9	0.7	-63	2.7	21.8	31
11/11/2008	2.0	1.7	-15	7.2	28.5	87
12/12/2008	2.1	1.4	-33	4.5	24.7	72

2009

The flow measurement sites stayed the same in 2009 as in 2008. Flow measurements were collected weekly in July through September. The flow measurements at the bottom of the McReynolds project also serve as the inflow and pre-project data for the Red Clover Poco Project constructed in 2010.

Table 7: Red Clover McReynolds Project Stream Flows (cfs)- 2009						
Date	Upstream of McReynolds and 1985 projects (Goodwin's Barn)	Red Clover Cr upstream of bedrock riffle (bottom of McReynolds project)	% change in stream flow from top to bottom of McReynolds project	Notson Bridge	Flournoy Bridge	Indian Creek below Indian Falls
5/12/2009	13.7	14.1	3.0	39.8	267	675
6/10/2009	6.9	6.0	-13	11.6	161	198
7/8/2009	1.6	0.6	-63	3.0	41	38
7/15/2009	2.1	0.5	-76	2.8	33.2	32
7/23/2009	1.8	<0.1	n/a	2.5	28.8	23
7/29/2009	1.6	<0.1	n/a	2.3	22.4	21
8/4/2009	1.6	<0.1	n/a	2.3	23.4	19
8/11/2009	1.5	<0.1	n/a	2.1	25.3	20
8/18/2009	1.5	<0.1	n/a	2.4	29.3	20
8/26/2009	1.3	<0.1	n/a	2.6	27.6	18
9/2/2009	1.6	<0.1	n/a	2.8	25.1	17
9/10/2009	1.4	<0.1	n/a	3.1	30.6	17
9/15/2009	1.3	<0.1	n/a	2.2	25.8	22
9/21/2009	1.4	<0.1	n/a	3.3	23.8	27
9/28/2009	1.4	<0.1	n/a	3.6	23.3	23
10/8/2009	1.4	<0.1	n/a	Dead battery	32.7	38
10/13/2009	Not measured	0.8	n/a	3.0	38.5	65
11/13/2009	1.7	2.0	18	5.2	35.3	83

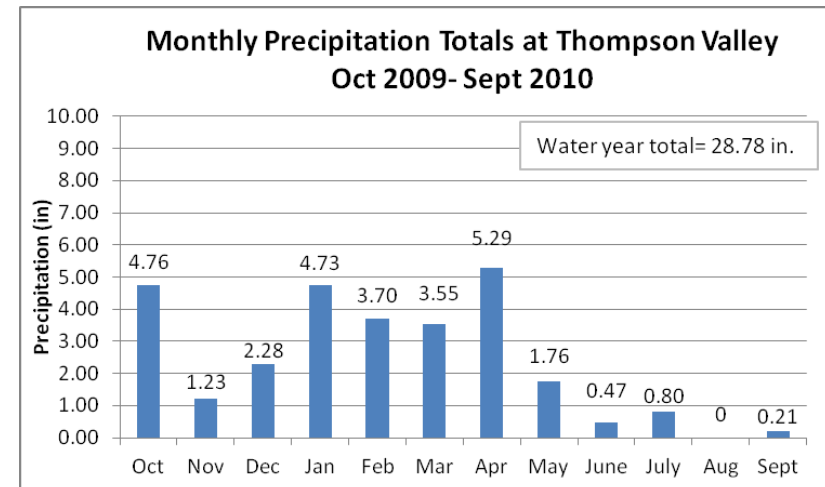
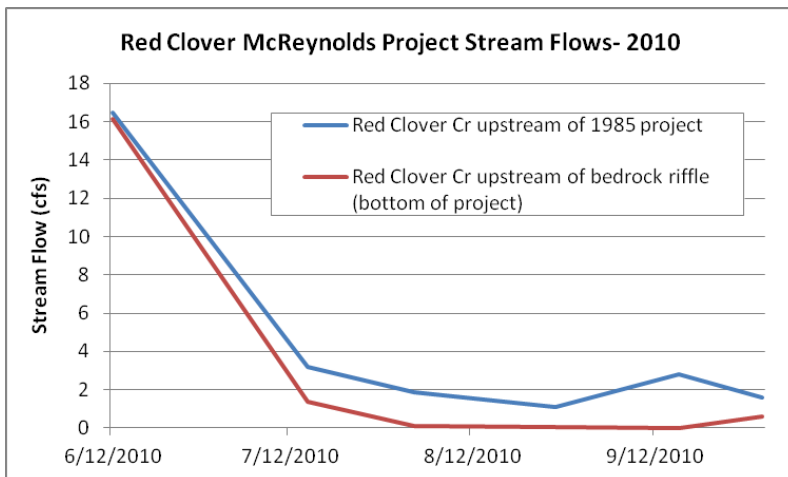


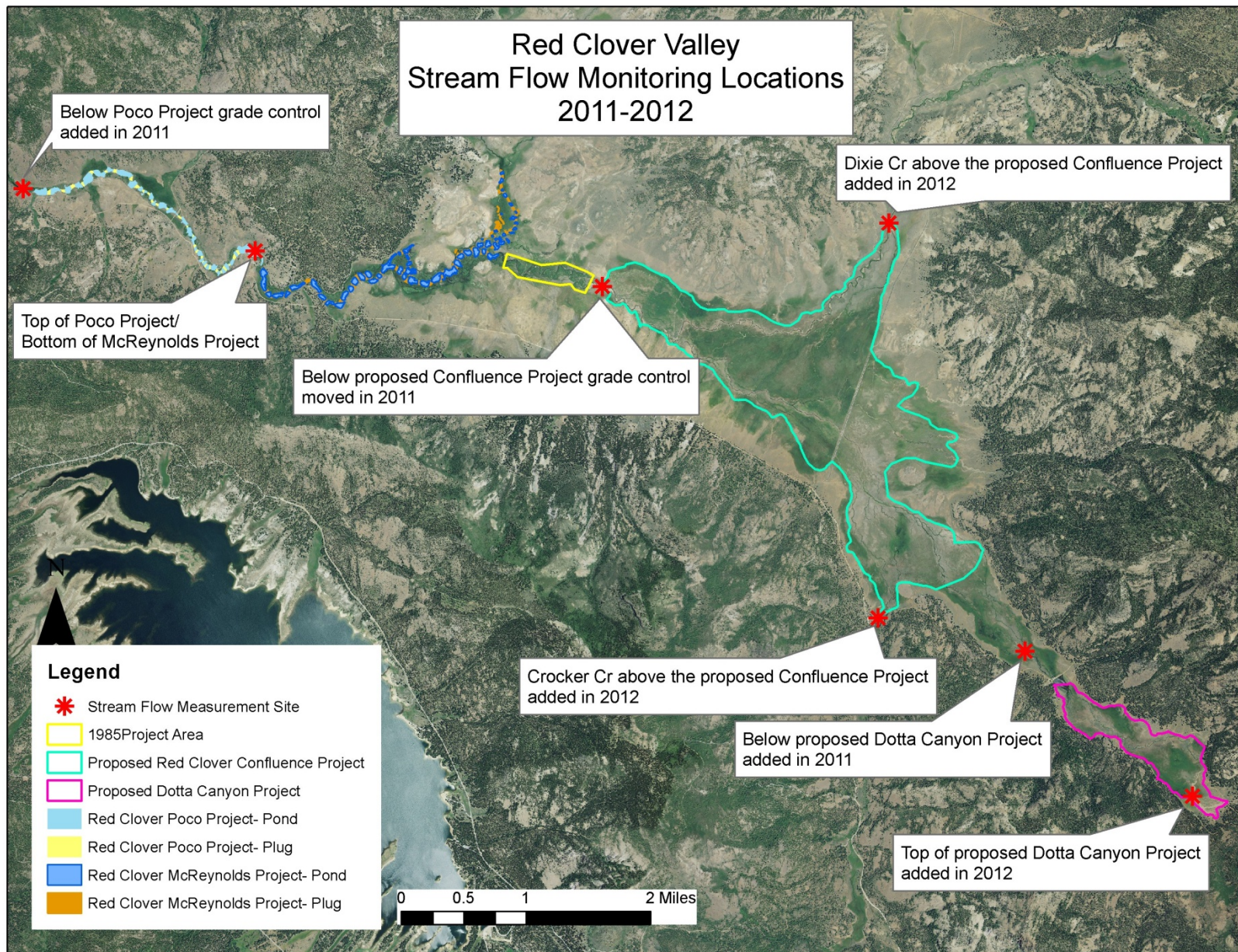
2010

The flow measurement sites remained the same in 2010 as in 2008 and 2009. Flow measurements were collected every other week in August and September. Stream flow coming out of the Red Clover McReynolds project did not reach zero in 2010 as it did in 2007-2009. The flow measurements at the bottom of the McReynolds project also serve as the inflow and pre-project data for the Red Clover Poco Project. Red Clover Poco Project construction began in August 2010. Water started to inundate the bottom flow measurement site, from project construction, in October 2010.

Table 8: Red Clover McReynolds Project Stream Flows (cfs)- 2010

Date	Upstream of McReynolds and 1985 projects (Goodwin's Barn)	Red Clover Cr upstream of bedrock riffle (bottom of McReynolds project)	% change in stream flow from top to bottom of McReynolds project	Notson Bridge	Flournoy Bridge	Indian Creek below Indian Falls
6/12/2010	16.5	16.1	-2	24.2	209	422
7/15/2010	3.2	1.4	-56	2.92	72	51
8/2/2010	1.9	0.1	-95	1.6	Data recorder error	31
8/26/2010	1.1	<0.1	n/a	1.9		20
9/16/2010	2.8	<0.1	n/a	2.6		29
9/30/2010	1.6	0.6	-63	2.7		30
10/27/2010	2.6	Could not measure due to back water from Red Clover Poco Project construction	n/a	5.9		138

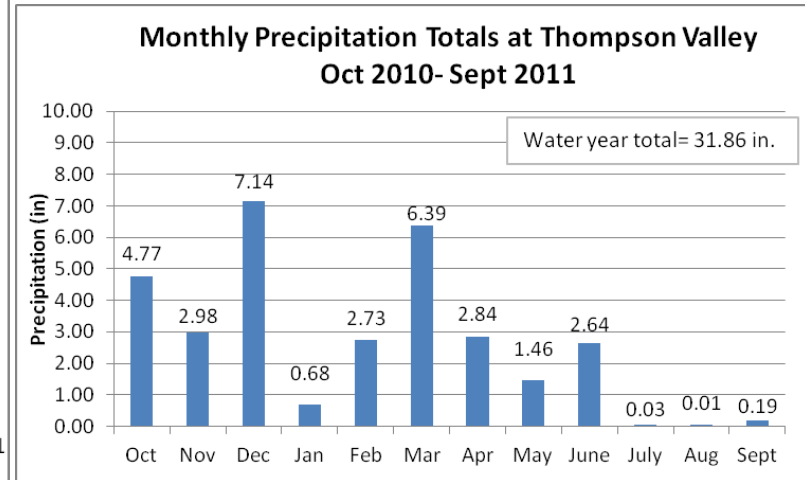
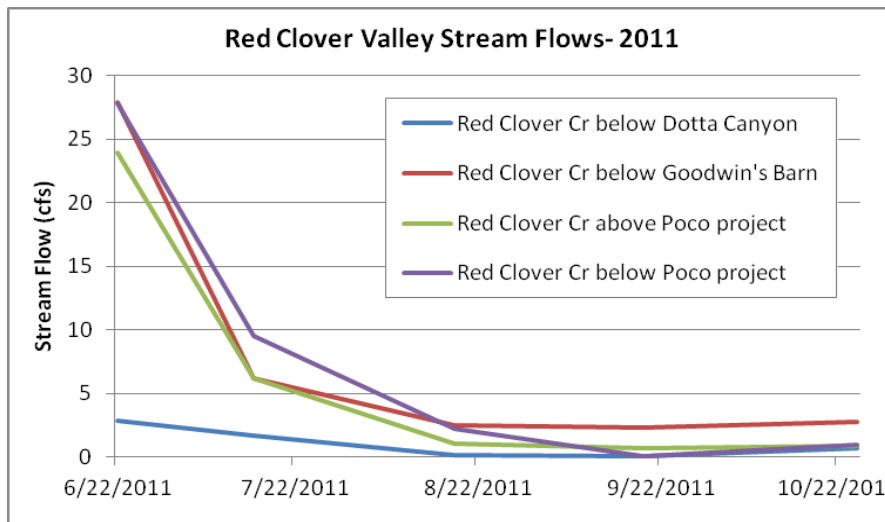




2011

In 2011 two more monitoring sites were added to the existing two sites. A measurement site was added downstream of the proposed Dotta Canyon Project. The monitoring site at the Goodwin Ranch barn and corrals was moved downstream about ¼ mile. This site was moved due to the proposed Red Clover Confluence Project. The stream at the barn would be effected by the Confluence Project, so was moved to below where the proposed grade control structure would be placed. The measurement site at the top of the Red Clover Poco Project was across the remnant channel at the first plug. This is essentially the same measurement site as below the Red Clover McReynolds Project above at the bedrock riffle. This site was measured until beaver moved into the project area and flooded the measurement site in August 2011. In August the top of the Red Clover Poco measurement was moved downstream to the upper US Forest Service Seepage Run stream flow measurement site. This was the closest location to the top of the project that was not being affected by beaver. The second measurement site was added downstream of the Red Clover Poco Project below the grade control structure.

Table 9: Red Clover Valley Stream Flows (cfs)- 2011									
Date	Below proposed Dotta Canyon Project	Below proposed Confluence Project just downstream from previous Goodwin's Barn measurement site	Top of Poco Project	Below Poco Project grade control	% change in stream flow from above 1985 project to top of Poco project	% change in stream flow from above 1985 project to bottom of Poco project	Notson Bridge	Flournoy Bridge	Indian Creek below Indian Falls
5/6/2011	28.9	Not wadeable	Not wadeable	Not wadeable	n/a	n/a	411.2	Data recorder error	2170
5/20/2011	11.5	71.8	82.1	89.4	14	25	123.7		1060
6/22/2011	2.9	27.9	24.0	27.8	-14	<-1	61.2		905
7/15/2011	1.7	6.2	6.2	9.6	0	55	12.4		215
8/18/2011	0.2	2.5	1.1	2.2	-56	-12	4.5	22.5	70
9/19/2011	<0.1	2.3	0.7	0.1	-70	-96	3.0	20.9	49
10/25/2011	0.7	2.8	0.9	1.0	-68	-64	2.5	36.6	91

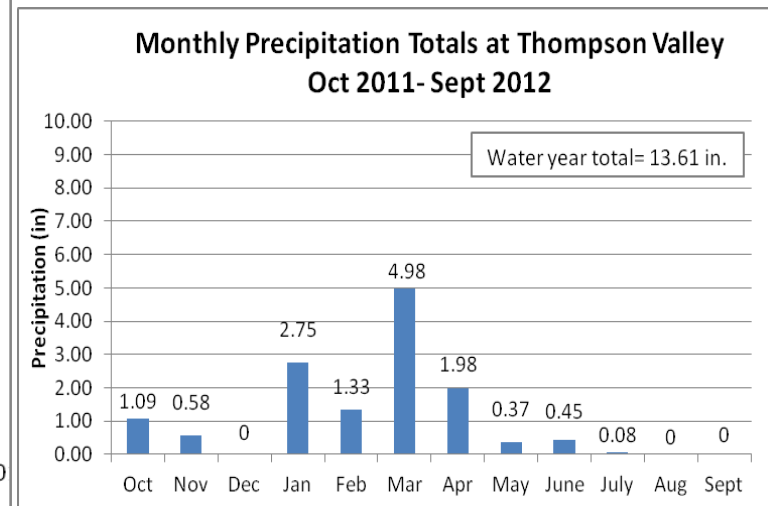
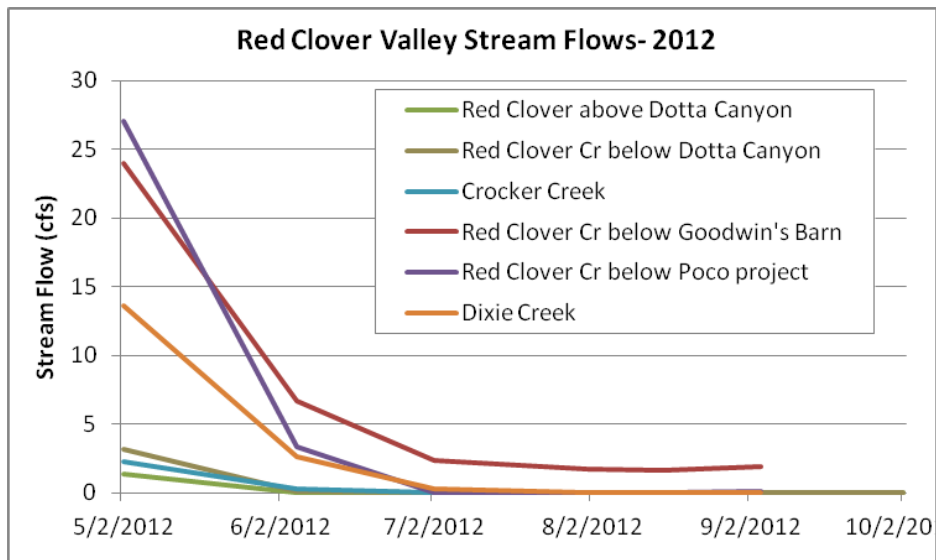


2012

In 2012 three new stream flow measurement sites were added in Red Clover Valley. A site was added above the proposed Dotta Canyon Project. Two new sites were added to measure tributary stream flow within the proposed Red Clover Confluence Project area. The measurement sites below the Dotta Canyon Project, below the proposed Red Clover Confluence grade control structure, and below the Red Clover Poco grade control structure remain in the same locations. The flow monitoring site at the top of the Red Clover Poco Project/below the Red Clover McReynolds Project was removed due to issues with beaver. Stream flow measurements to date are included in Table 10.

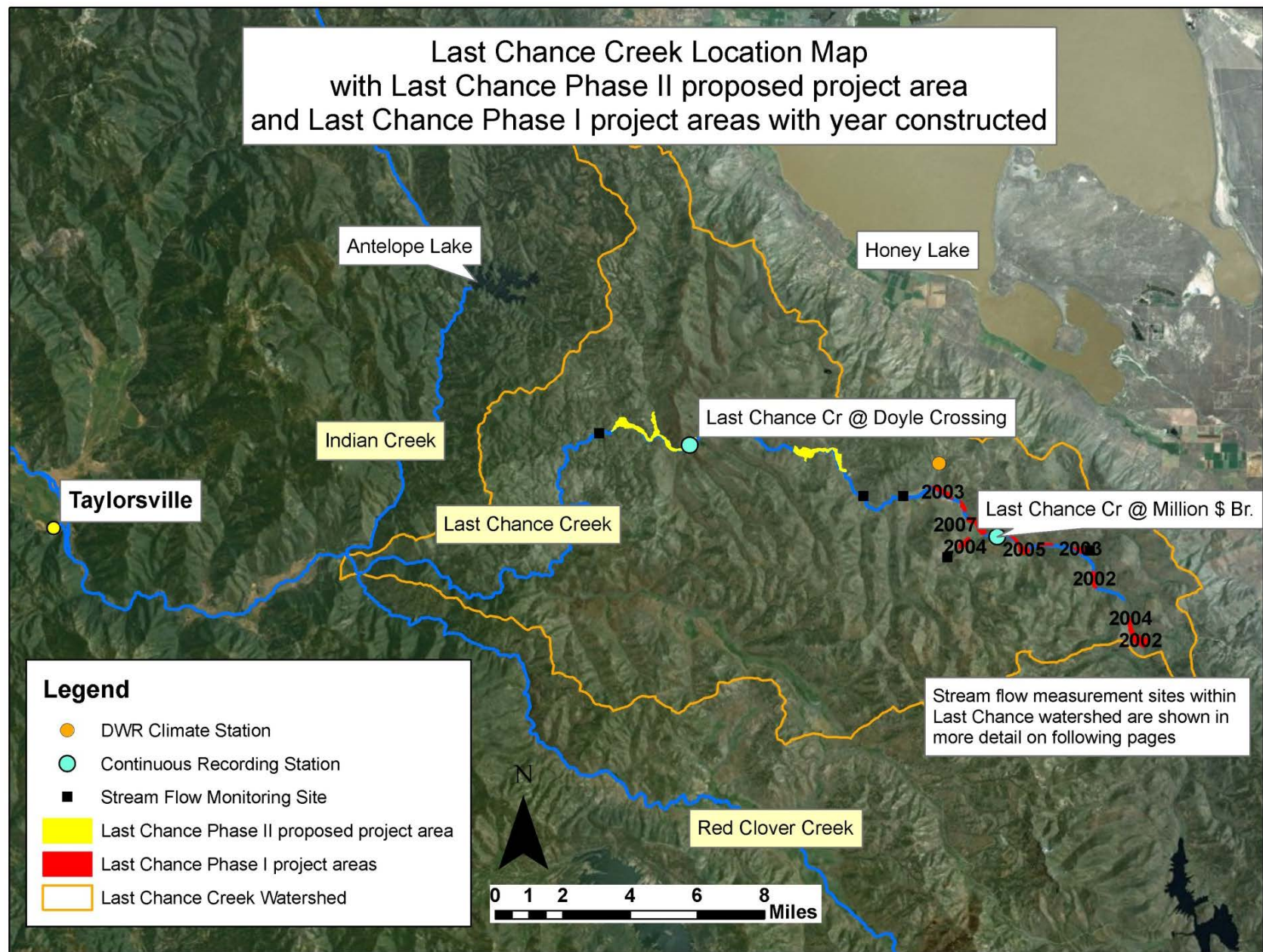
Table 10: Red Clover Valley Stream Flows (cfs)- 2012

Date	Above the proposed Dotta Canyon Project	Below the proposed Dotta Canyon Project	Crocker Cr above the proposed Confluence Project	Dixie Cr above the proposed Confluence Project	Below proposed Confluence Project grade control	Below Poco Project grade control	% change in stream flow from below confluence project to below Poco project	Notson Bridge	Flournoy Bridge	Indian Creek below Indian Falls
5/2/2012	1.4	3.2	2.3	13.6	24.0	27.0	13	56.0	299.3	831
6/5/2012	Dry	0.1	0.3	2.6	6.7	3.3	-51	7.9	62.5	185
7/2/2012	Dry	<0.1	Dry	0.3	2.3	<0.1	n/a	3.0	26.5	42
8/1/2012	Dry	<0.1	Dry	Dry	1.8	<0.1	n/a	2.2	22.1	14
9/4/2012	Dry	Dry	Dry	Dry	1.6	<0.1	n/a	2.3	34.9	14
10/2/2012	Dry	Dry	Dry	Dry	1.9	<0.1	n/a	2.4	Data not available	15



Last Chance Creek

Stream flow monitoring on Last Chance Creek was initiated by the California Department of Water Resources in 1966-1971 at the proposed Dixie Refuge Dam-site. In 1999 the FRCRM installed a continuous recording stream gage at Doyle Crossing. The continuous recording station collects stream stage and water temperature every 15 minutes and stores this data as hourly averages. Stream stage is calibrated to flow with monthly stream flow measurements. The FRCRM has maintained the continuous recording station at Doyle Crossing from 1999-present. In 2004 the FRCRM added an additional continuous recording station on Last Chance Creek at Million Dollar Bridge, as well as some additional stream flow monitoring sites. In 2008 and 2011-present the FRCRM added two new stream flow monitoring stations above and below the proposed Last Chance Phase II restoration project. The results from these monitoring efforts are displayed in tables below along with stream flow data from Indian Creek below Indian Falls (ICR). In 2011 and 2012 tables also show percent change in stream flow from the top of the Last Chance Phase II project to the bottom of the Last Chance Phase project. Stream flow monitoring maps may show more than one year's monitoring stations.



1966-1971

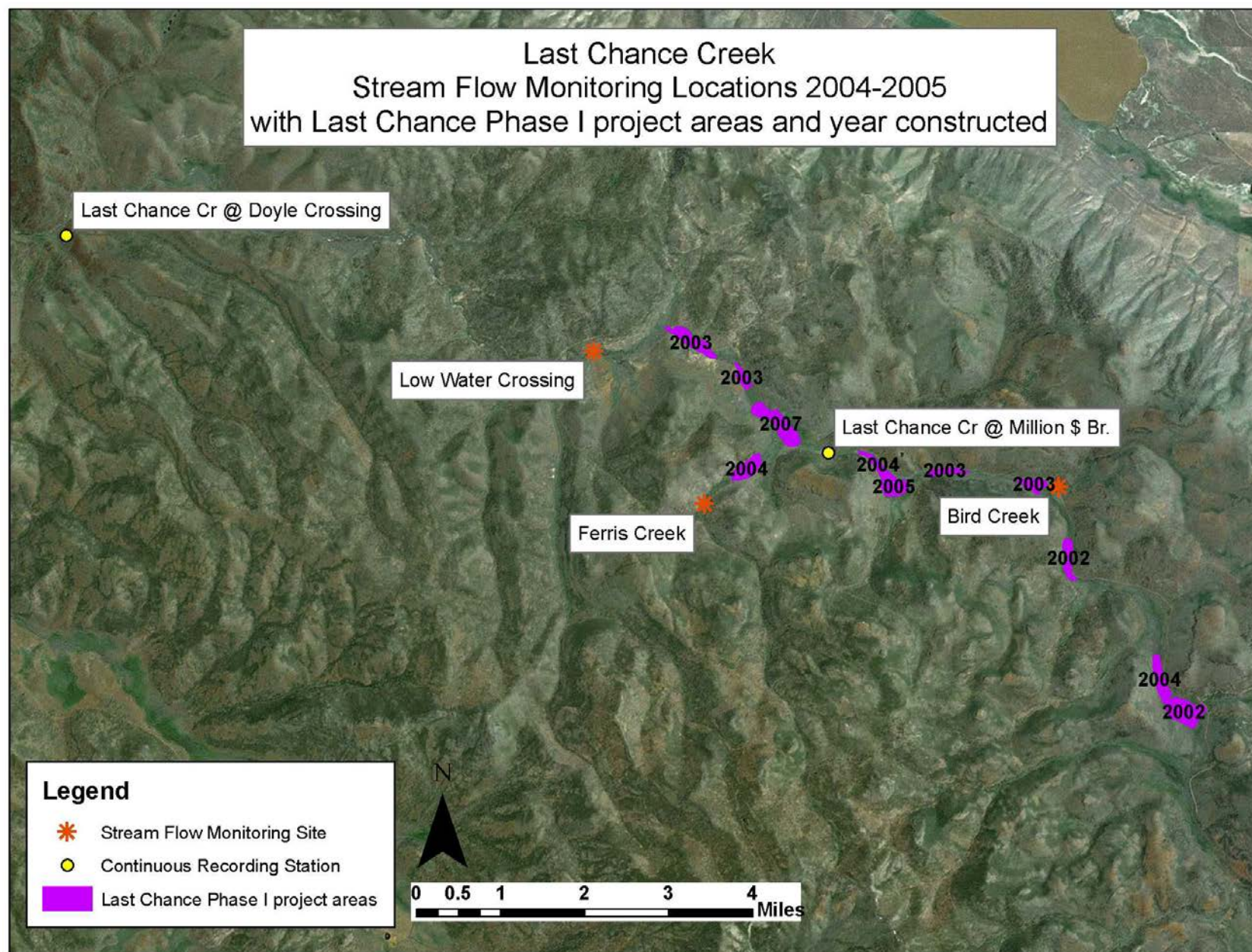
In 1966 the California Department of Water Resources (DWR) started monitoring stream flow on Last Chance Creek near the current low water crossing to determine the feasibility of a dam at this site. Table 11 below displays the results of the DWR monitoring effort.

Table 11: Last Chance Creek Stream Flows (cfs) at the proposed Dixie Refuge Dam-site near current low water crossing.												
Water Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.
1966	1	3	2	3	2	38	17	4	<1	0	0	0
1969	<1	1	1	139	38	69	179	82	17	2	<1	<1
1970	<1	1	7	160	45	39	26	21	4	<1	0	<1
1971	<1	1	6	48	18	69	100	152	64	4	1	<1

Continuous Recording Station Data

The Doyle Crossing stream flow monitoring station has been the focus of FRCRM stream flow monitoring efforts on Last Chance Creek since 1999. Table 12 displays average monthly stream flow on Last Chance Creek at Doyle Crossing for the past thirteen water years. Blanks in the data table represent missing data due computer recording errors. In 2011 the continuous recording computer had a battery failure. More in depth continuous recording station data can be found on the FRCRM website (www.feather-river-crm.org) monitoring page.

Table 12: Average Monthly Stream Flow on Last Chance Creek at Doyle Crossing (cfs)													
Water Year	% Normal	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept
2000	101%	3.0	-	-	16.2	55.5	-	83.7	19.5	3.2	1.2	0.6	0.9
2001	56%	1.0	1.2	2.8	4.6	2.2	16.7	4.3	1.4	0.8	0.6	0.6	0.7
2002	77%	0.8	1.7	5.1	16.9	23.2	44.0	44.1	13.8	2.4	0.4	0.1	0.1
2003	111%	0.5	1.6	7.3	39.8	25.8	47.7	65.2	47.0	4.9	0.9	0.5	0.4
2004	83%	0.6	0.4	2.1	10.3	28.2	115.6	31.7	5.4	1.9	0.4	0.1	-
2005	109%	0.8	0.9	3.3	-	19.3	87.0	81.0	37.3	6.2	0.9	0.1	0.4
2006	154%	1.2	0.8	44.9	150.8	86.0	142.5	266.1	86.2	6.3	1.0	0.3	0.5
2007	60%	0.9	0.8	0.7	1.4	6.6	28.9	12.0	3.7	1.3	0.1	0.1	0.3
2008	68%	1.9	1.4	0.9	6.3	3.2	76.4	44.2	14.6	3.8	1.3	0.5	0.8
2009	84%	2.4	2.5	3.3	3.1	12.2	55.2	25.9	8.4	3.7	1.3	0.9	0.9
2010	101%	1.4	1.0	1.3	4.2	14.4	43.1	73.2	54.7	9.6	2.4	1.0	1.1
2011	142%	1.3	Battery Error									1.2	0.7
2012	79%	1.0	0.3	0.1	1.4	2.7	15.6	22.3	6.7	2.3	0.6	0.2	0.4
Average		1.3	1.1	6.5	23.2	23.3	61.2	62.8	24.9	3.9	0.9	0.5	0.6



2004-2005

The FRCRM began constructing meadow restoration projects on the mainstem of Last Chance Creek in 2002. Eight reaches were constructed between 2002 and 2005. The FRCRM installed a second continuous recording station just downstream of these projects at Million Dollar Bridge in 2004. The Million Dollar Bridge recording station only collects stream flow data during the high flow and runoff seasons (winter into the early summer). In 2004 in addition to collecting stream flow data at Doyle Crossing and Million Dollar Bridge, the FRCRM monitored stream flow on Last Chance Creek at the low water crossing (near the 1966-1971 measurement site), on Ferris Creek, and on Bird Creek. The stream flow measurement on Ferris Creek was taken downstream of the project area, and the stream flow measurement on Bird Creek was taken on Bird Creek upstream of the project area and upstream of the confluence with Last Chance Creek.

	Bird Creek	Last Chance Creek at Million Dollar Br	Ferris Creek	Last Chance Creek at Low Water Crossing	Last Chance Creek at Doyle Crossing
8/3/2004	<0.1				
8/24/2004			<0.1		0.5
9/20/2004			0.2		0.7
10/11/2004			0.1		0.7
10/20/2004			0.3	0.1	2.3
11/11/2004			0.3	0.2	2.3
12/9/2004			0.8	8.0	3.7
12/15/2004		0.3	0.6	1.0	3.8

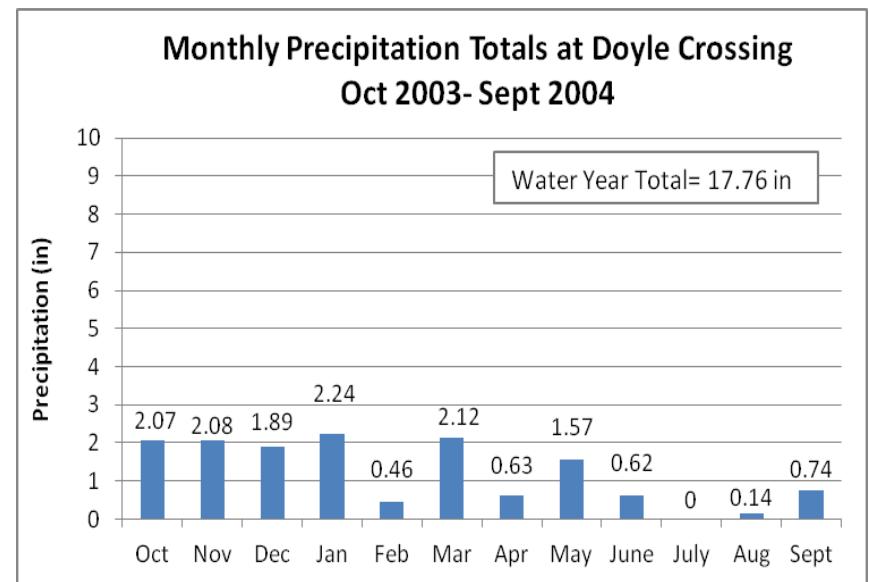
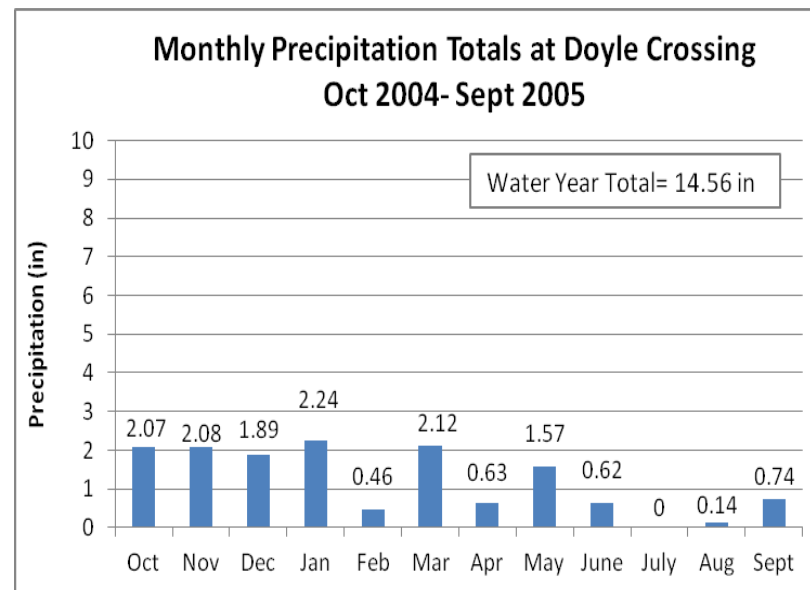
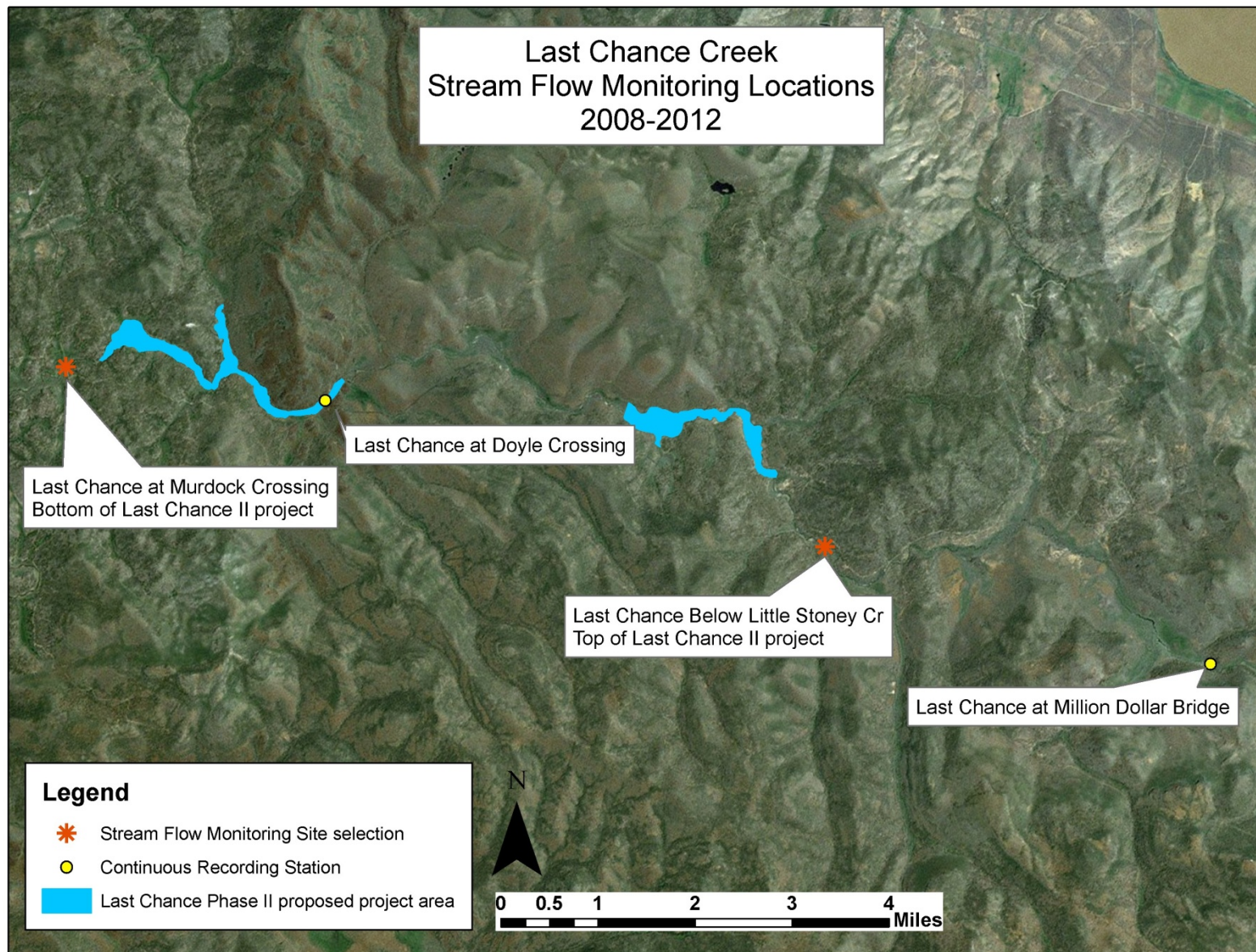


Table 14: Last Chance Watershed Stream Flows (cfs)- 2005				
	Last Chance Creek at Million Dollar Br	Ferris Creek	Last Chance Creek at Low Water Crossing	Last Chance Creek at Doyle Crossing
2/16/2005	1.4	0.7	3.2	16.2
2/28/2005	4.0	0.9		42.2
3/23/2005		2.2		114.2
4/14/2005	4.5	5.0		70.8



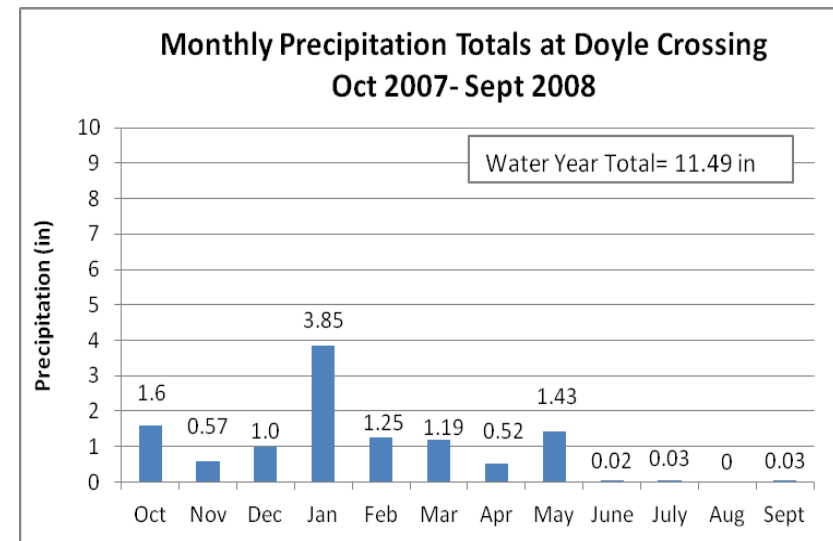
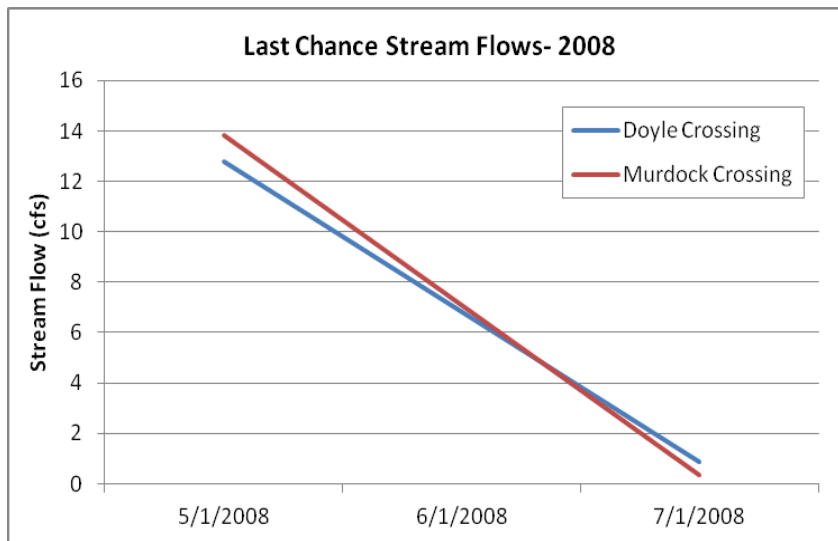


2008

In 2008 the FRCRM began collecting pre-project stream flow data at Murdock Crossing for the proposed Last Chance Phase II project. Murdock Crossing is downstream of the proposed Last Chance II project about ½ mile. Stream flow measurements continue to be collected at Doyle Crossing and Million Dollar Bridge.

Table 15: Last Chance Watershed Stream Flows (cfs)- 2008

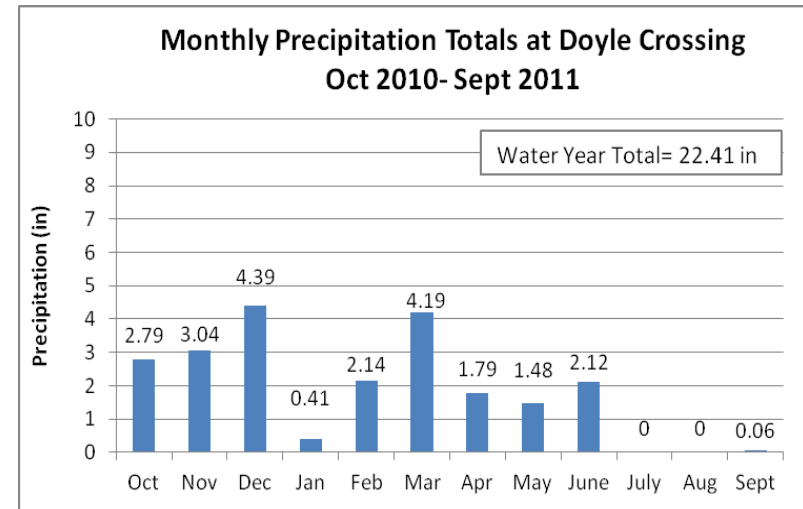
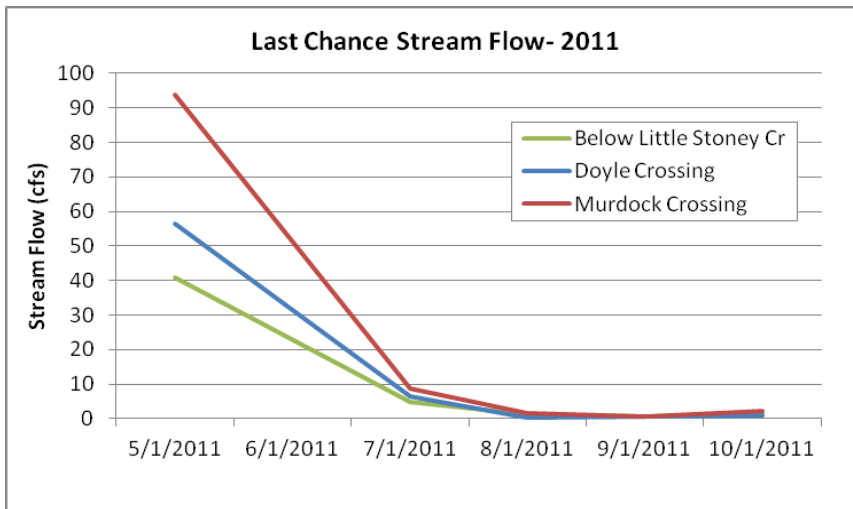
	Last Chance Creek at Million Dollar Bridge	Last Chance Creek at Doyle Crossing	Last Chance Creek at Murdock Crossing	% change in stream flow from Doyle to Murdock Xing	Indian Creek at Flournoy Bridge	Indian Creek below Indian Falls
5/13/2008	0.3	12.8	13.8	8	86.3	250
7/29/2008	Dry	0.9	0.4	-56	17.3	10



2011

In addition to the three existing stream flow measurement sites from 2008, Last Chance Creek below Little Stoney Creek was added in 2011. The Last Chance Creek below Little Stoney Creek measurement site is upstream of the proposed Last Chance Phase II Restoration Project. These sites were measured monthly. The Doyle Crossing continuous recording station had a battery failure in 2008. Stream flow data is only available from monthly stream flow measurements rather than continuously.

Table 16: Last Chance Watershed Stream Flows (cfs)- 2011							
	Last Chance Creek at Million Dollar Bridge	Last Chance Creek Below Little Stoney Creek	Last Chance Creek at Doyle Crossing	Last Chance Creek at Murdock Crossing	% change in stream flow from top to bottom of LCII project	Flournoy Bridge	Indian Creek below Indian Falls
5/19/2011	8.9	Not wadeable			n/a	Data recorder error	1150
5/26/2011	9.8	40.8	56.6	93.8	129		1260
6/7/2011	36.2	Not wadeable			n/a		2970
6/21/2011	2.8	Not wadeable			n/a		900
7/7/2011	0.3	4.7	6.4	8.8	87		399
8/5/2011	Dry	1.2	0.3	1.5	25	36.6	90
9/9/2011	Dry	0.8	0.6	0.7	-13	<20	43
10/7/2011	Dry	1.6	1.0	2.4	50	54	118

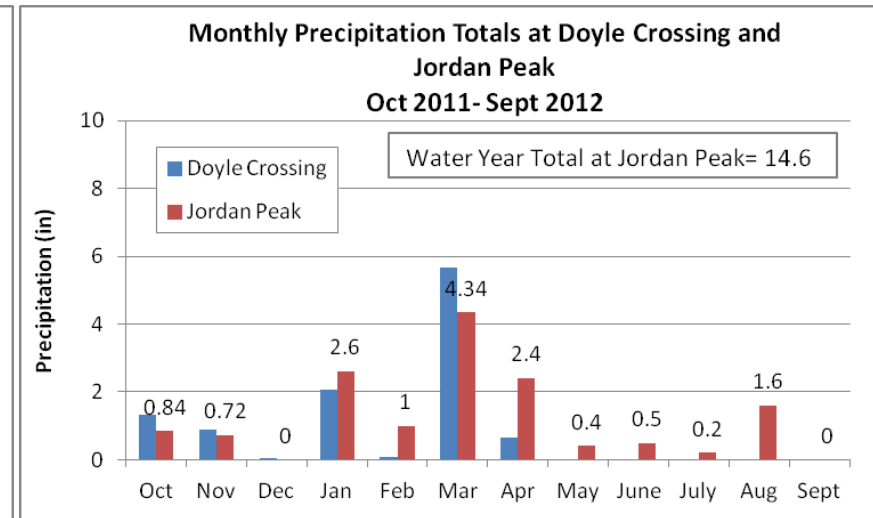
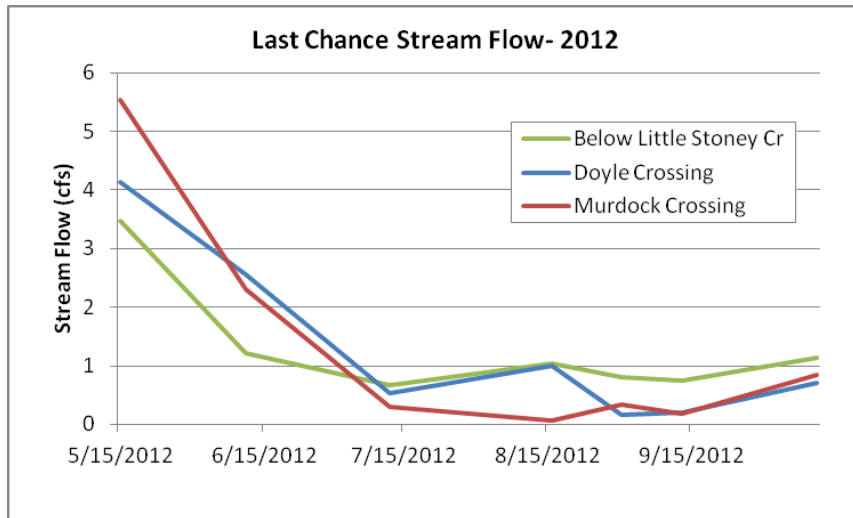


2012

Table 17 displays the stream flow measurement data on Last Chance Creek to date in 2012. No additional sites were added in 2012. The Doyle Crossing precipitation gage stopped collected data in May 2012 for the rest of the water year. Jordan Peak precipitation is included for comparison.

Table 17: Last Chance Watershed Stream Flows (cfs) to date in 2012							
	Last Chance Creek at Million Dollar Bridge	Last Chance Creek Below Little Stoney Creek	Last Chance Creek at Doyle Crossing	Last Chance Creek at Murdock Crossing	% change in stream flow from top to bottom of LCII project	Flournoy Bridge	Indian Creek below Indian Falls
3/27/2012	2.1	Not wadeable	13.2	21.4	n/a	125.8	434
5/15/2012	0.2	3.5	4.1	5.5	57	106.4	342
6/11/2012	Dry	1.2	2.6	2.3	92	51.8	110
7/12/2012	Dry	0.7	0.5	0.3	-57	22.9	28
8/16/2012*	Dry	1.0	1.0	<0.1	n/a	26.1	16
8/31/2012	Dry	0.8	0.2	0.3	-63	31.5	10
9/13/2012	Dry	0.8	0.2	0.2	-75	33.8	13
10/12/2012	Dry	1.1	0.7	0.9	-18	Data Not Available	20

* Thunder showers on 8/15 with 1.6" of rain at Jordan Peak rain gage (Gage is located above Jordan and Artray creeks- tributaries to Last Chance Creek above Million \$ Bridge).



Literature Cited

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