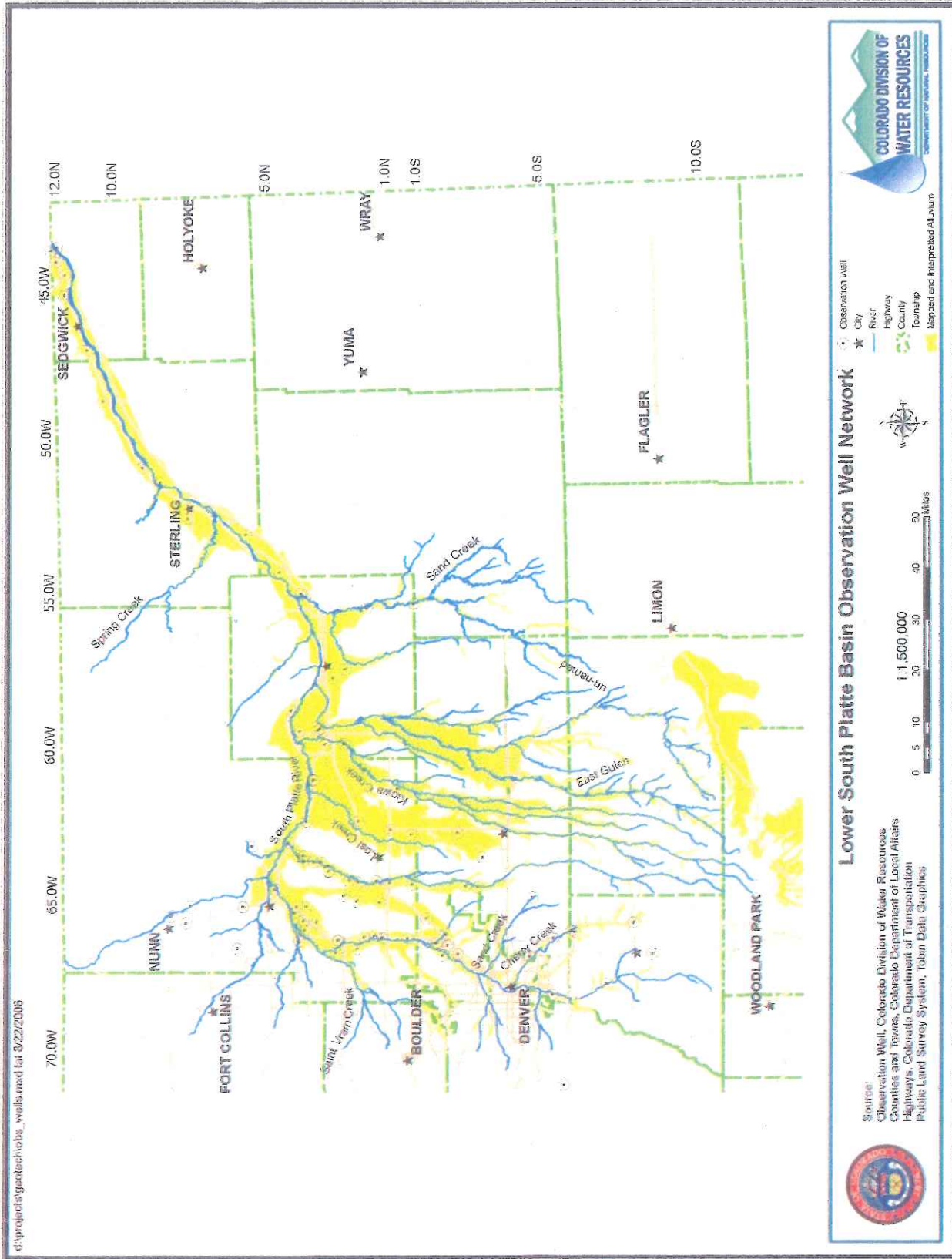


H

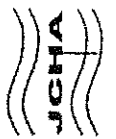


Presentation By Robert Longenbaugh, P.E.
 Concerning HB 16-1314. For Colorado Legislators
 State Capitol Building, March 18, 2016

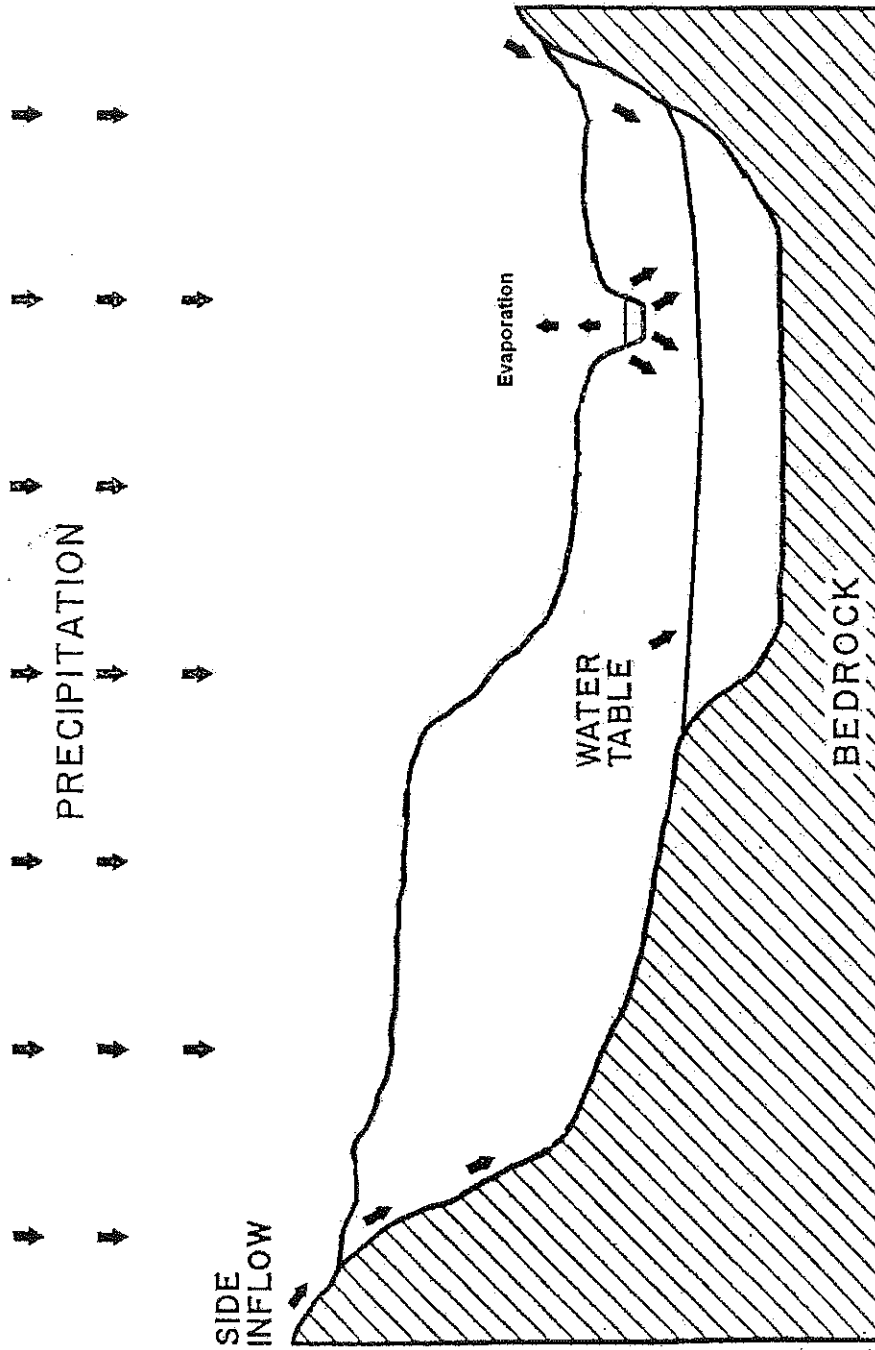
d:\projects\gdr\chobc_wells.mxd lat 8/22/2008

History Of Water Use In South Platte River Basin

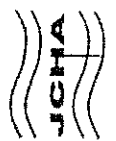
1850	Pre-irrigation conditions river flows, GW levels, phreatophytes
1852	Irrigation begins – surface ditch diversion from river changes that occurred river flow, GW levels
1870-1910	Reservoirs added to supplement ditch diversions
1910-1965	Large capacity irrigation wells added to supplement ditch diversions and reservoir releases
1940's	Impact of well pumping on river flow surfaced
1953-57	Major drought, large number of irrigation wells drilled
1964-65	Major drought, more irrigation wells drilled
1963-64	Senior ditches brought law suit to stop pumping of irrigation wells
1965	Statute passed – Ground Water Management Act
1967-68	Studies made to document impact of well pumping on stream flows
1969	Statute passed – 1969 Act
1973	Wells decreed – entered into priority system
1972	GASP and CCWCD formed to augment for well depletions to river
1974-78	South Platte Ditch Artificial Recharge Demonstration Project
1973-2001	Conjunctive use of ground and surface water practiced allowing use of irrigation wells
2002	Drought – Wells were still allowed to pump under GASP or CCWCD
2001-05	Court Cases and new legislation limit irrigation well use
2005-2010	Irrigation well pumping curtailed in over 4,000 wells
2010	South Platte River alluvium has over 10.5 million ac-ft in storage



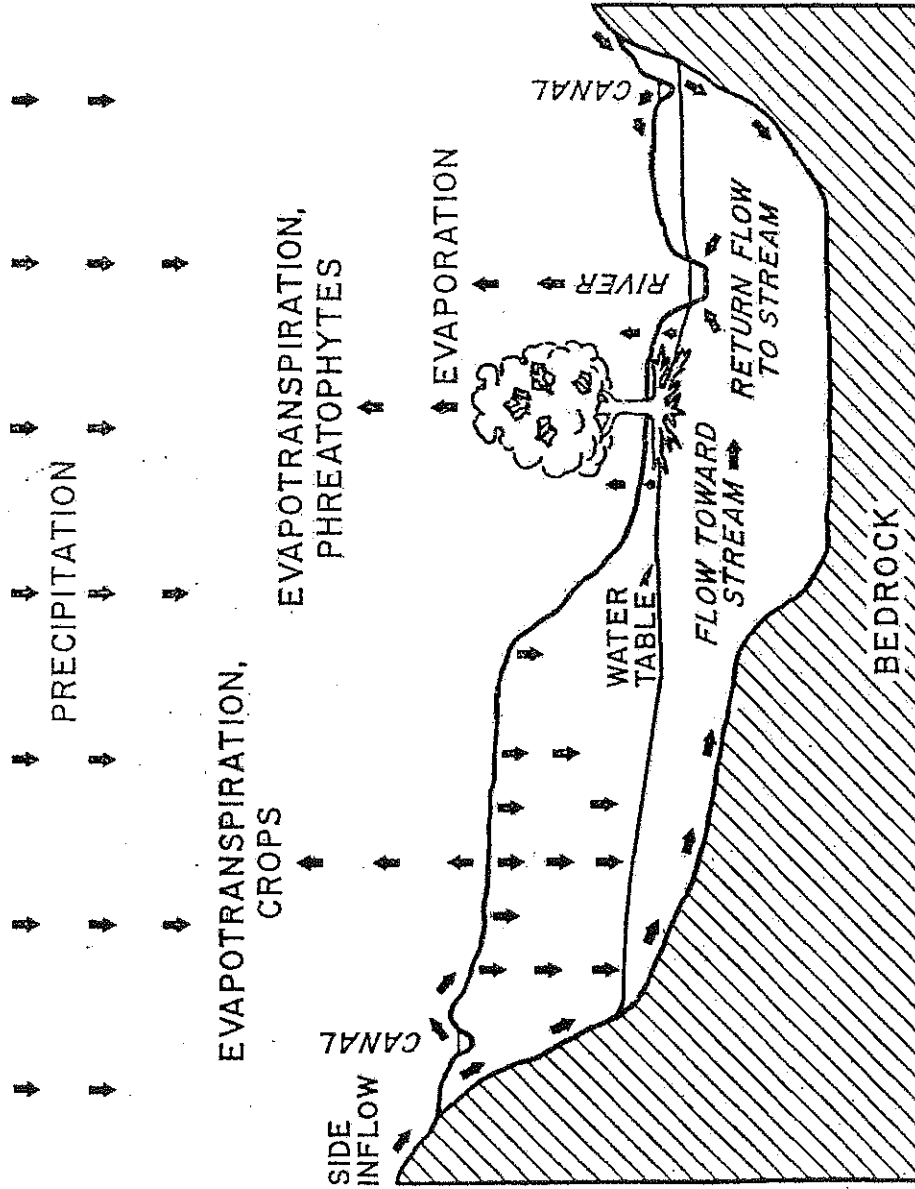
Typical X – Section Of South Platte River Pre-Irrigation Time Frame - 1850



Losing River – River flows going to ground water
 River Flows only during spring snow melt runoff or following thunderstorms
 No trees or phreatophytes



Typical X – Section Of South Platte River After 40 Years Of Irrigation - 1900

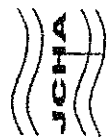


Gaining River – River flows increasing over time and flowing further down valley. Becoming perennial stream.

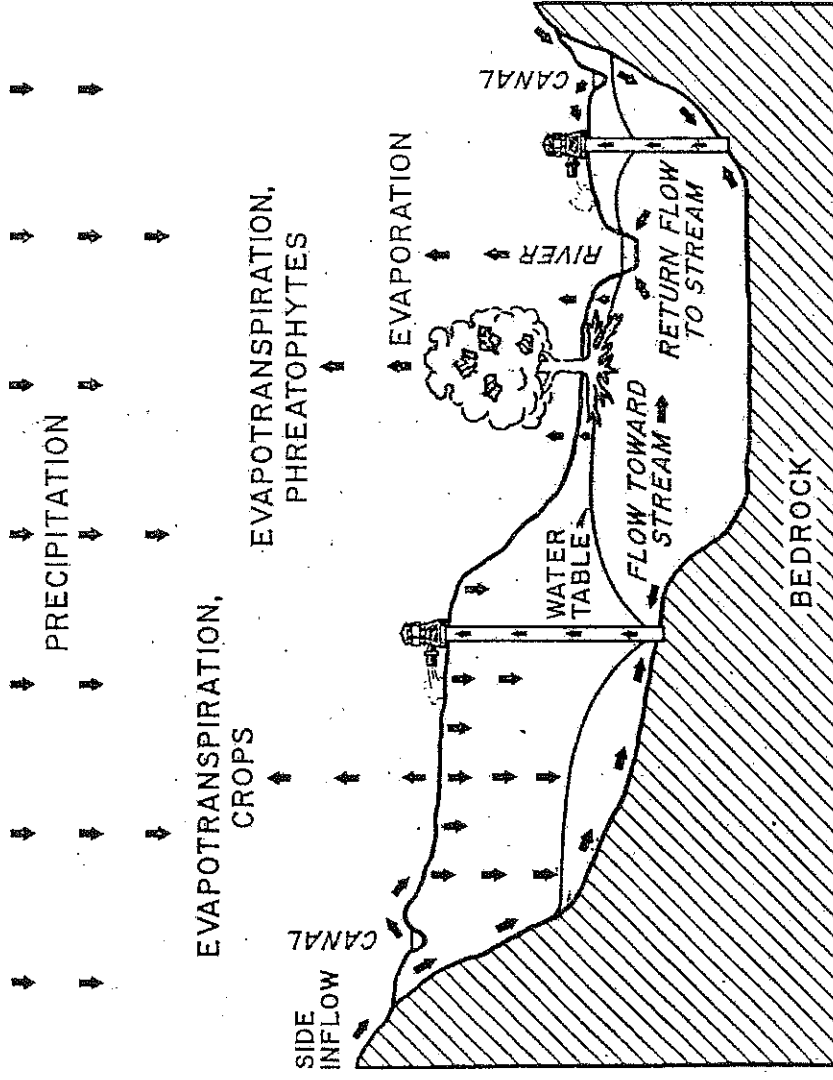
Ground water levels rose 40-70 feet.

Ground water flows to river and responsible for perennial conditions.

Some cottonwood and willows growing.



Typical X – Section Of South Platte River With Irrigation and Irrigation Wells - 1950



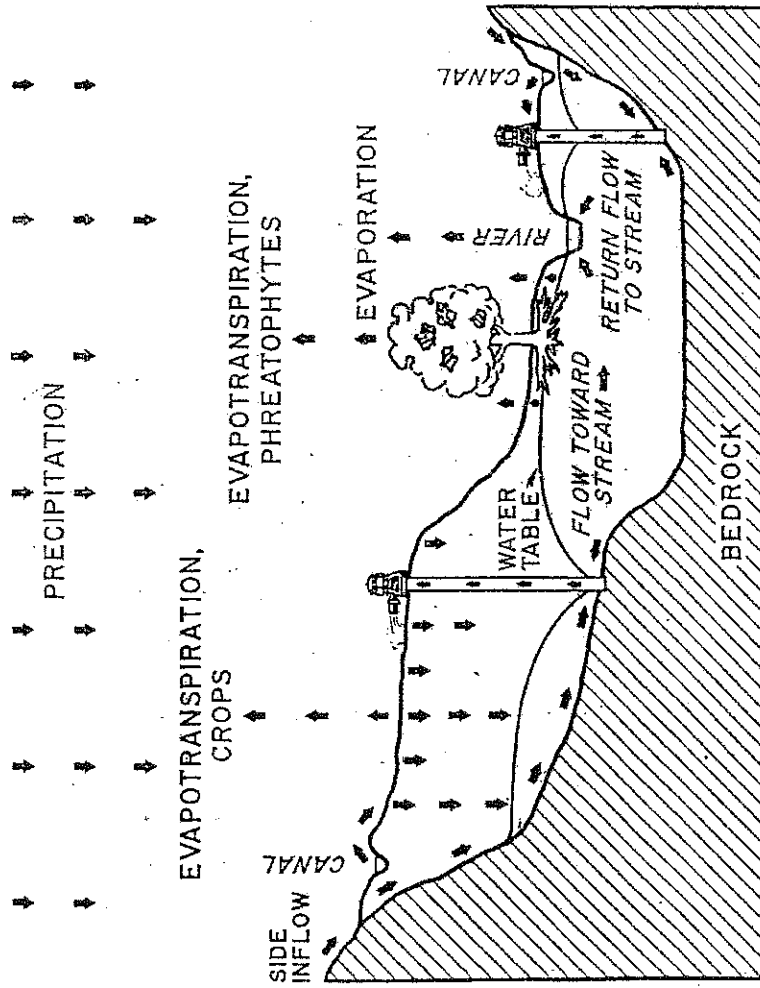
Gaining River, Perennial River System.

Ground water levels fluctuate but river acts as drain.

9,000 decreed wells are pumping and impact river flows.

Phreatophytes increasing.

Typical X – Section Of South Platte River River Stream/Aquifer System - 2010



Gaining River – Perennial River Flows.

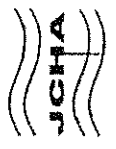
Transmountain water diversions being used to extinction.

Conservation measures reducing stream flows.

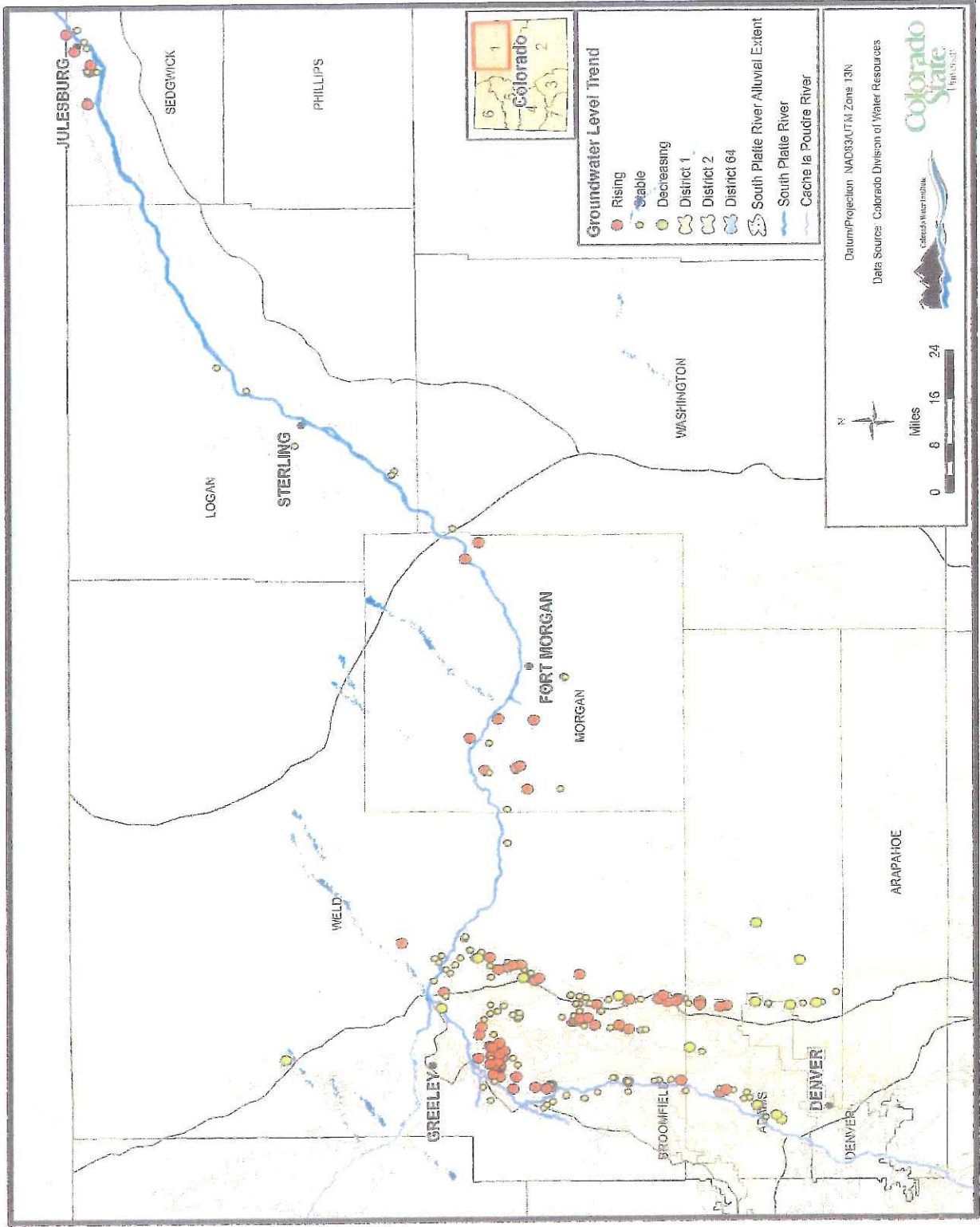
Phreatophytes continuing to increase.

Over 4,000 of the 9,000 irrigation wells are totally or partially restricted from G.W. pumping.

Over 20,000 ac-ft of water flowed to Nebraska in water year 2009 above and beyond the compact.



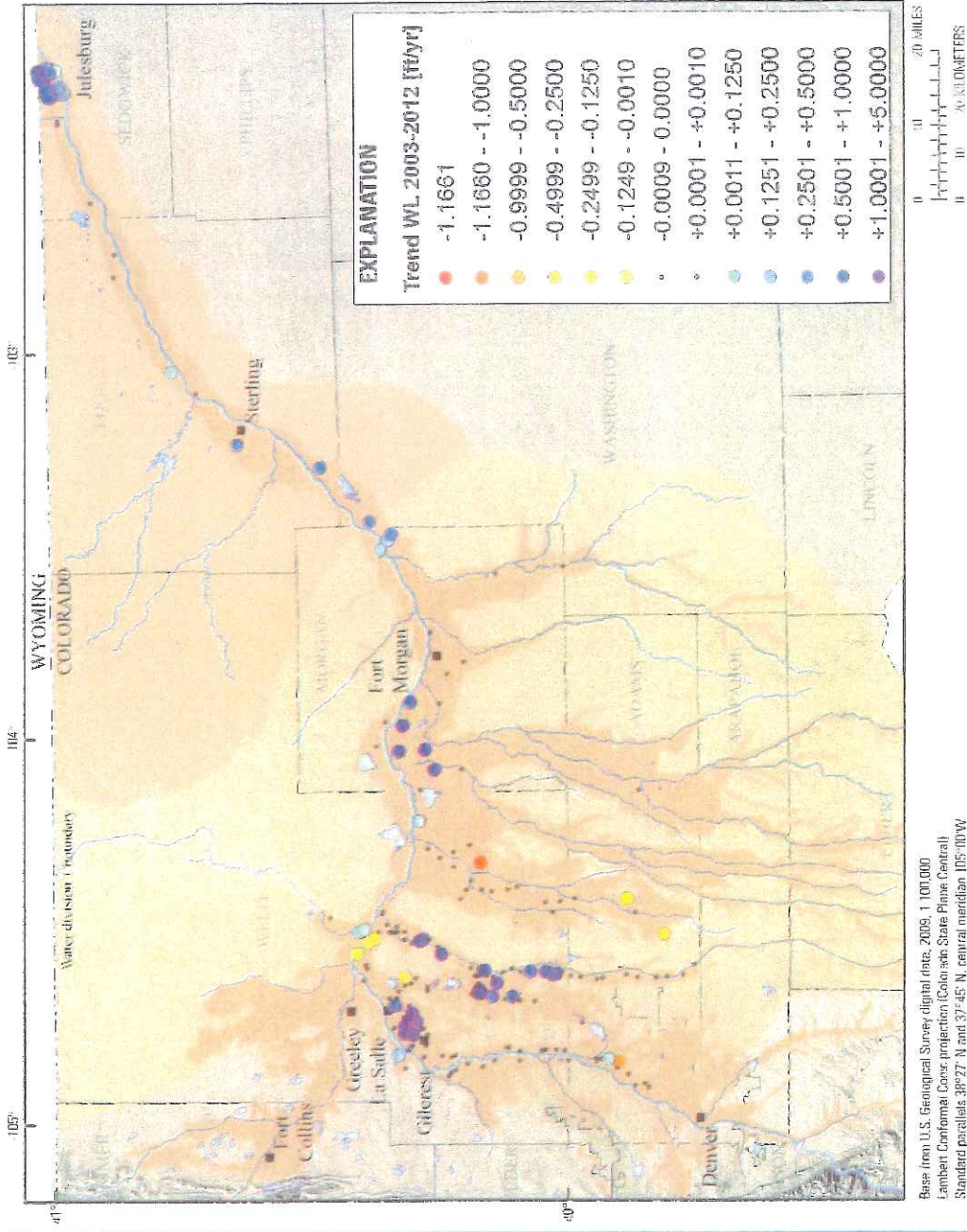
Groundwater Depth Trends Over 2000-2012 for Observation Wells



Water Level Trends: 2003-2012

Rising water in most locations over last decade

Declining water isolated along Lost Creek and locations near Kersey



GROUNDWATER LEVELS
in the
LOWER SOUTH PLATTE RIVER BASIN
ALLUVIAL AQUIFER
2014



by
Kevin C. Donegan



COLORADO
Division of Water Resources
Department of Natural Resources

John W. Hickenlooper
Governor

Mike King
Executive Director, DNR

Dick Wolfe
State Engineer

Matthew A. Sares
Project Manager

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WATER LEVELS IN THE LOWER SOUTH PLATTE RIVER BASIN ALLUVIAL AQUIFER 2014

This report contains basic data concerning the depth to and elevation of groundwater in the alluvial aquifer of the Lower South Platte River Basin and select tributaries collected during the spring and fall of 2014. Water level measurements in this year's report were obtained by Colorado Division of Water Resources personnel, USGS personnel and District Water Commissioners Mark Trivisonno and Steve Peterson. Measurements are usually taken twice a year, typically in the spring before irrigation pumping commences and again in the fall after irrigation pumping has ceased. A map showing the location of each monitoring well in this report is included (Figure 1).

This report contains 111 new, semi-annual measurements. The current 115 monitoring well network consists of 60 privately owned wells, 36 monitoring wells installed by the South Platte Decision Support System (SPDSS) and 19 wells associated with the USGS National Water-Quality Program (NAWQA). The 36 SPDSS, 19 NAWQA and one private well are outfitted with automated water-level data-collection devices (data loggers). The data loggers collect daily water level data which are uploaded into HydroBase. Only the semi-annual manual measurements are listed in this report.

As in previous reports, the accompanying data table only lists data from the last 10 years, though the hydrographs display the full period of record. The report also contains data from wells that are normally a part of this monitoring effort, but for which measurements were not available in 2014. Wells lacking measurements in the past 10 years have been removed from the monitoring program and are no longer included in this publication.

On average, groundwater levels have risen approximately 1.5 feet across the basin since 2013. They have generally risen just under one foot compared to 2009 (5-year comparison) and just over 2 feet compared to 2004 (10-year comparison) measurements. Figure 2 is a map showing fall 2014 measured depth to water below ground surface. Figure 3 shows 15 wells for which the 2014 measurement represents the highest water level on record. The wells are labeled for easy reference to their data page.

The Colorado Water Conservation Board (CWCB) provided funding to replace failed data loggers and associated equipment and Division staff installed replacements as needed during the spring and fall water level monitoring events.

An electronic copy of this report is available on the Division of Water Resources website <http://water.state.co.us/groundwater/Pages/HydroGeo.aspx>. Additionally, all groundwater level data may be accessed and exported using the tools available on the Colorado Decision Support System website: <http://cdss.state.co.us/onlineTools/Pages/GroundWaterWaterLevels.aspx> and the Colorado Information Marketplace HydroBase Bulk Data Exporter: <https://data.colorado.gov/Information-Sharing/DWR-Well-Water-Level/hfwh-wsgi>

In addition to the alluvial groundwater levels presented in this report, Division staff are actively involved in two special project areas - Sterling and LaSalle/Gilcrest. Groundwater levels in these areas are being monitored as separate programs. The Division is conducting multi-year studies, with funding provided by the CWCB, to gather the relevant data needed to identify the factors contributing to high groundwater level conditions identified by landowners in these areas. Water level data specific to these project areas can be accessed through the Division 1 website at:

<http://water.state.co.us/DivisionsOffices/Div1SPlatteRiverBasin/Pages/Div1SPlatteRB.aspx>

GROUNDWATER LEVELS
in the
LOWER SOUTH PLATTE RIVER BASIN
ALLUVIAL AQUIFER
2015



by
Kevin C. Donegan



COLORADO
Division of Water Resources
Department of Natural Resources

John W. Hickenlooper
Governor

Robert W. Randall
Interim Executive Director, DNR

Dick Wolfe
State Engineer

Matthew A. Sares
Project Manager

WATER LEVELS IN THE LOWER SOUTH PLATTE RIVER BASIN ALLUVIAL AQUIFER - 2015

This report contains basic data concerning the depth to and elevation of groundwater in the alluvial aquifer of the Lower South Platte River Basin and select tributaries collected during the spring and fall of 2015. Water-level measurements in this year's report were obtained by Colorado Division of Water Resources (DWR) personnel, USGS personnel and Deputy District Water Commissioner Steve Peterson. Measurements are usually taken twice a year, typically in the spring before irrigation pumping commences and again in the fall after irrigation pumping has ceased. A map showing the location of each monitoring well in this report is included (Figure 1).

This report contains 135 semi-annual measurements from 2015. The current 140-well network consists of 83 privately owned wells, 36 monitoring wells installed by the South Platte Decision Support System (SPDSS) and 21 wells associated with the USGS National Water-Quality Program (NAWQA). Under the direction of House Bill 15-1166, 25 wells have been added to the monitoring network. These wells were chosen because they were measured in the past and have a historical period of record or because they are located in a geographic data gap from the previous network.

The 36 SPDSS, 21 NAWQA and one private well are outfitted with automated water-level data-collection devices (data loggers). The data loggers collect daily water-level data which are uploaded into HydroBase, DWR's free online water database. Only the semi-annual manual measurements are listed in this report.

As in previous reports, the accompanying data table only lists data from the last 10 years, though the hydrographs display the full period of record. The report also contains data from wells that are normally a part of this monitoring effort, but for which measurements were not available in 2014. Wells lacking measurements for the past 10 years have been removed from the monitoring program and are no longer included in this publication.

On average, groundwater levels have risen about one-half foot across the basin since 2014. They have generally risen just under one foot compared to 2010 (5-year comparison) and just over three feet compared to 2005 (10-year comparison) measurements. Figure 2 is a map showing depth to water below ground surface measured during the fall of 2015.

The Colorado Water Conservation Board (CWCB) provided funding to replace failed data loggers and associated equipment and Division staff installed replacements as needed during the spring and fall water level monitoring events. The CWCB also funded a project to survey the measuring point elevations with high-precision GPS. The survey report can be downloaded by following this link:

<http://dwrweblink.state.co.us/dwrweblink/0/doc/2859436/Page1.aspx?searchid=ec9ca3dd-f15a-40b5-9c52-0270b960feee>

In addition to the alluvial groundwater levels presented in this report, Division staff are actively involved in two special project areas - Sterling and LaSalle/Gilcrest. Groundwater levels in these areas are being monitored as separate programs. The Division is conducting multi-year studies, with funding provided by the CWCB, to gather the relevant data needed to identify the factors contributing to high groundwater level conditions identified by landowners in these areas. Water level data specific to these project areas can be accessed through the Division 1 website at:

<http://water.state.co.us/DivisionsOffices/Div1SPlatteRiverBasin/Pages/Div1SPlatteRB.aspx>

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and the Colorado Information Marketplace HydroBase Bulk Data Exporter:
<https://data.colorado.gov/Information-Sharing/DWR-Well-Water-Level/hfwh-wsgi>

or the Colorado Decision Support System MapViewer:
<http://water.state.co.us/DataMaps/GISandMaps/MapViewer/Pages/FAQ.aspx>

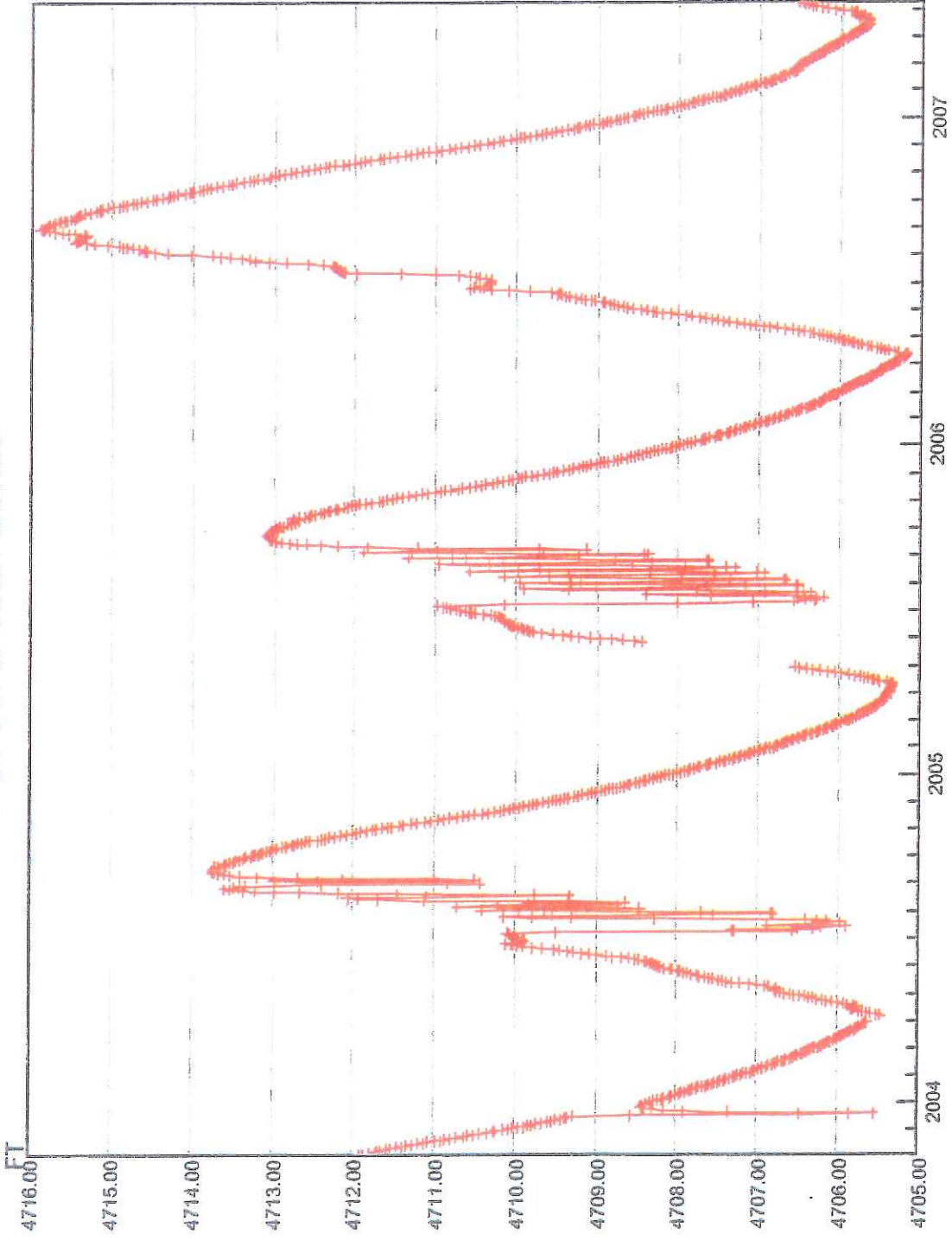
If you have any questions regarding groundwater and the information in this report, please contact the Groundwater Information Desk at (303) 866-3587.



Continuous Water Level Measurements

- The SPDSS project constructed and instrumented 35 monitoring wells.
- Hourly measurements from pressure transducers record water level changes.
- When a nearby well starts to pump the monitoring well shows that cone of depression and how it deepens.
- When the nearby well stops pumping water levels quickly begin to rise and may return to pre-pumping levels within a few days or months.
- Data from the 35 SPDSS data logger wells does not show long term depletions due to well pumping.
- Water Levels for many of the SPDSS monitoring wells returns to an equilibrium condition each spring.

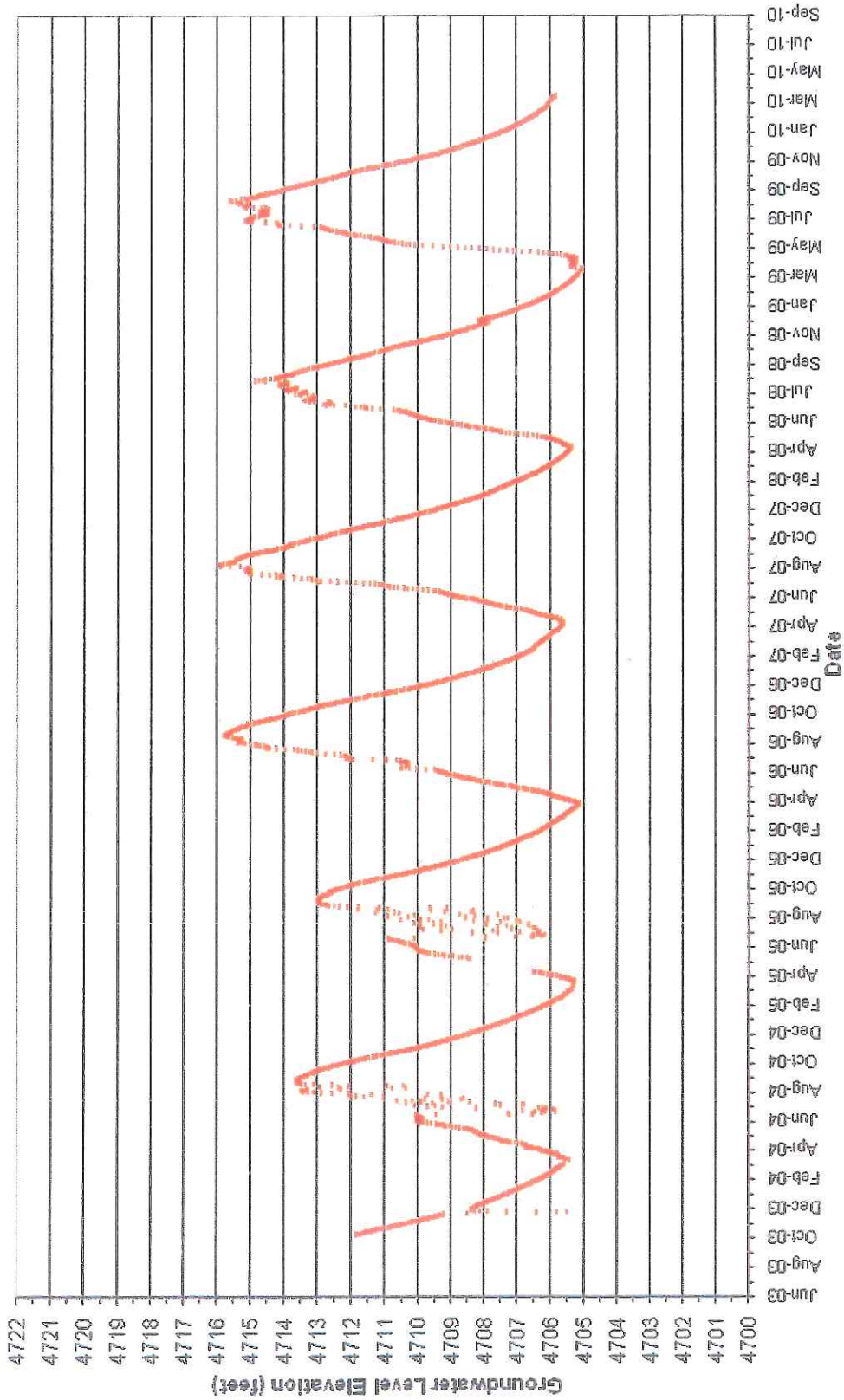
Well Level Time Series



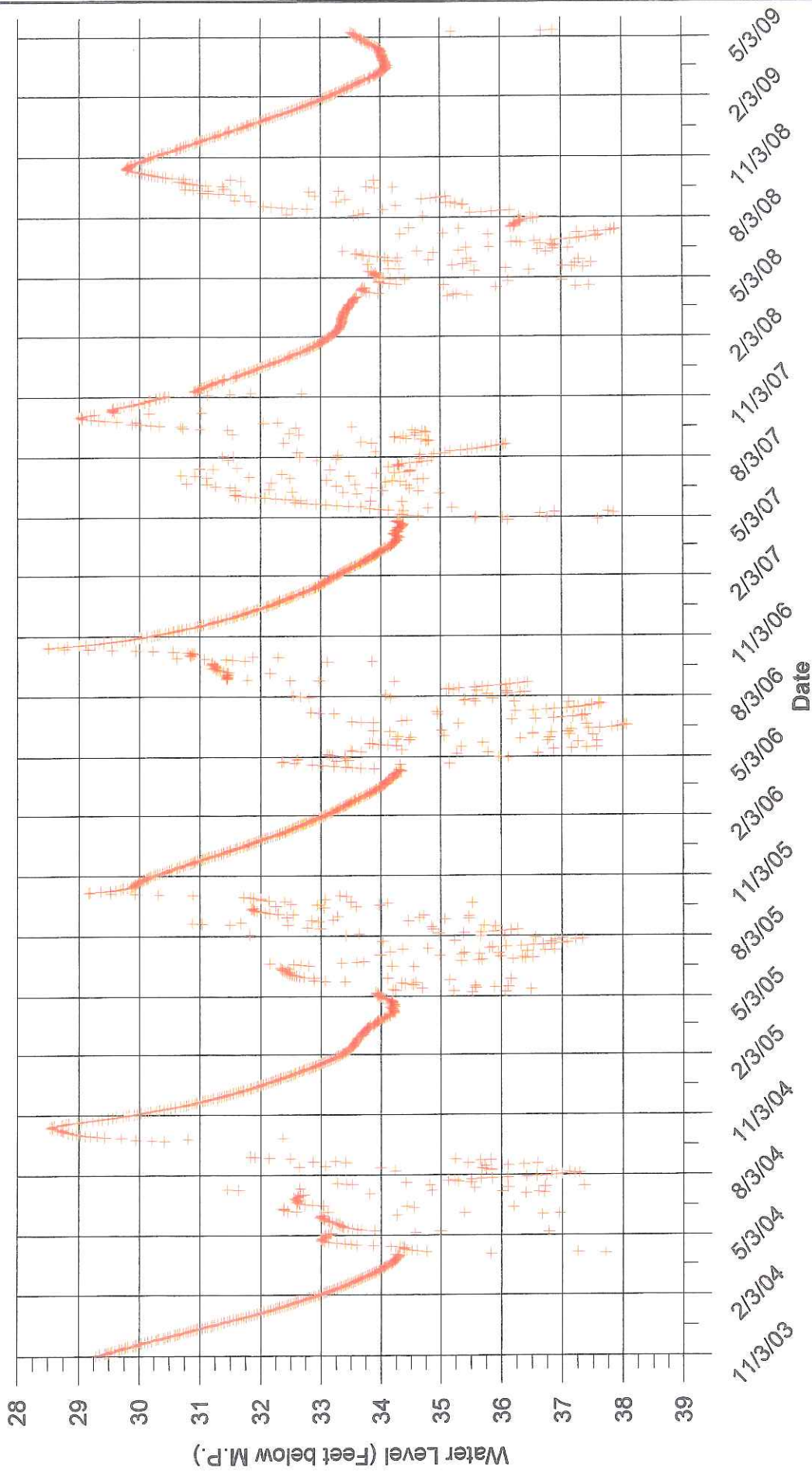
+ DSS02MLK (datum 4728.6 FT), SB00406606CC.SPDSS.WellLevel.Day (2003-11-03 to 2007-05-08)



Figure D-15 - DSS02MLK



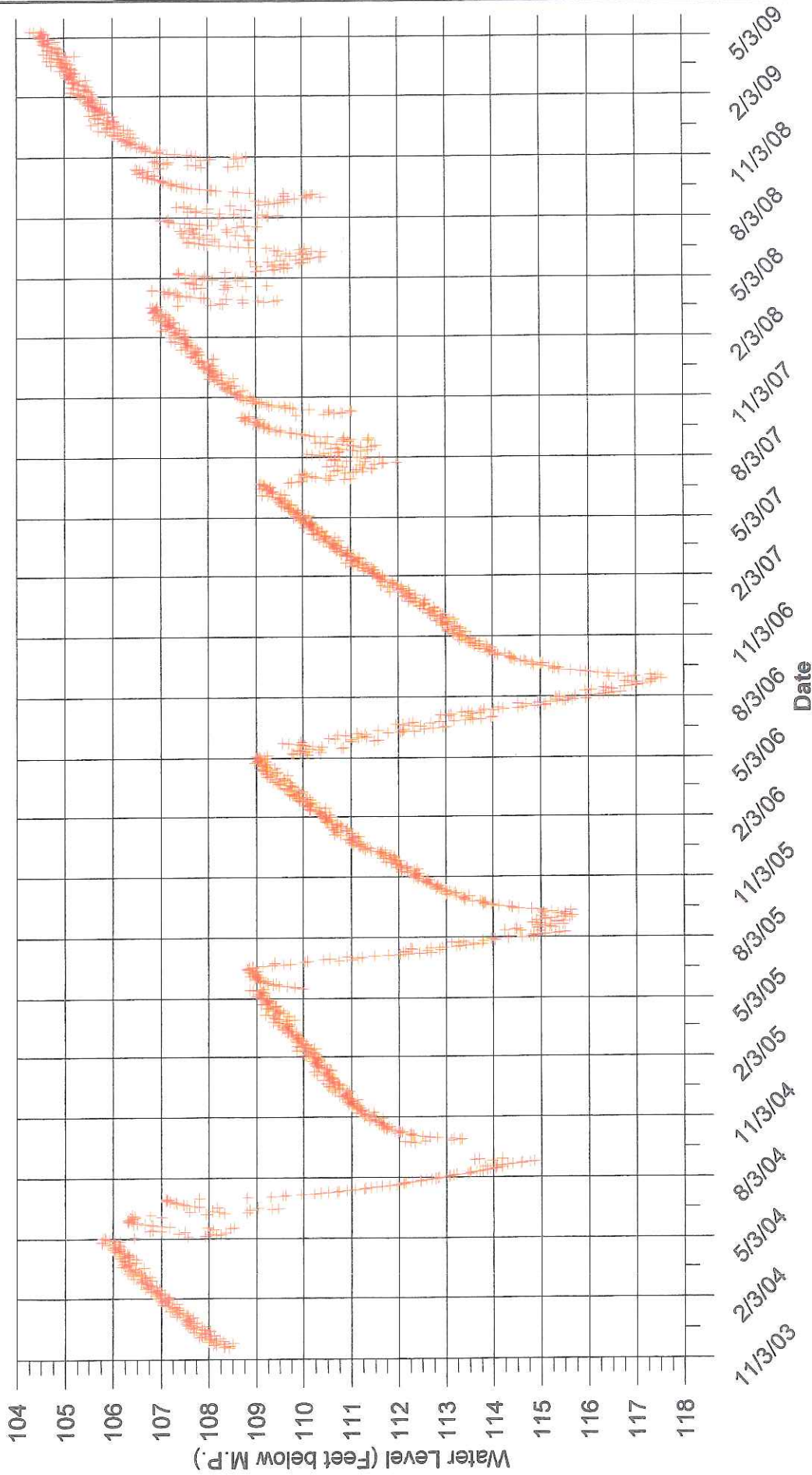
DSS030CH



SOUTH PLATTE STUDY	
Water Table Elevation for Well DSS030CH	
File: DSS030CH-1	Date: 1/20/2010
Project No: 5965-P	Drawn By: AWK
	Fig.No: 2

DSS030CH
+ Water Level

DSS04WIG




DSS04WIG
 + Water Level

SOUTH PLATTE STUDY	
Water Table Elevation for Well DSS04WIG	
File: DSS04WIG-1	Date: 1/20/2010
Project No: 5965-P	Drawn By: AWK Fig No. 3



River Depletions Due to Well Pumping

- Well pumping causes cones of depression to form near the pumped well.
- Continuous pumping causes cones to deepen and expand outward.
- Lowering of ground water levels cause return flow to the river to decrease resulting in river depletions.
- When wells stop pumping – cones begin to fill and river depletions decrease.
- If the water levels rise to or above pre-pumping conditions, then there are no further river depletions.



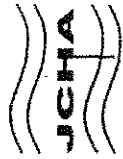
Depletions to River Due to Ground Water Pumping Do Not Appear to be Long Term

- Observation well data show that for most of South Platte impacts due to pumping are erased annually.
- Need technology to accurately predict depletions due to pumping and accretions due to artificial recharge.
- Failure to accurately predict depletions and accretions will result in injury.
- Adequate data and use of accurate technology are absolute requirements for ground water management.
- Conjunctive use of both ground and surface water is needed to maximize water available for Colorado's citizens.

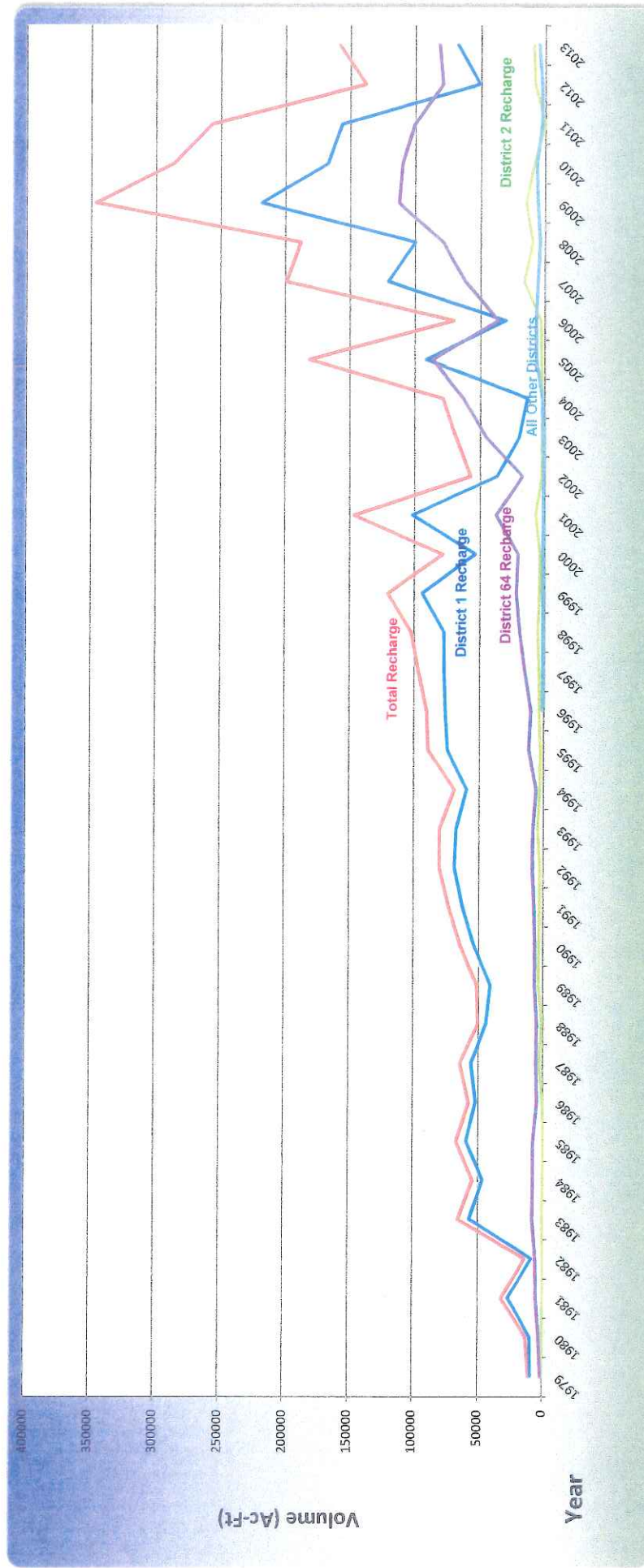


Monitoring of Ground Water Levels Is Needed to Manage the Ground Water Resource

- Ground Water levels were first measured by Code in the late 1920's. Long term historic records are desirable.
- Agencies that have monitored G.W. levels include CSU, USGS, CCWCD, LSPWCD and DWR.
- A map has been prepared to show the location of historical measurements.
- A state agency needs to be assigned the responsibility for collecting ground water data.
- Adequate funding and staffing are needed to assure collection of needed data.
- Data must be entered into and maintained in a public data base.



History of Annual Volume (Ac-ft/yr) Artificially Recharged for W.D # 1, 2 + 64. Update from Dave Nettles 7/31/2014



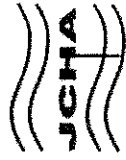
Annual Groundwater Pumping in Water Districts 2, 1 and 64 (AF/yr)





South Platte River Flows at Julesburg

- Stream gauge station at Julesburg records the amount of water delivered to Nebraska, cfs or ac-ft/day.
- Compact requires Colorado to deliver 120 cfs for April 1 – October 15 period.
- Colorado has allowed more flow to Nebraska than what Compact requires.
- Excess flow to Nebraska has been increasing since 2005.



Water-Data Report 2013

06764000 SOUTH PLATTE RIVER AT JULESBURG, CO—Continued

DISCHARGE, CUBIC FEET PER SECOND
 WATER YEAR OCTOBER 2012 TO SEPTEMBER 2013
 DAILY MEAN VALUES
 [e, estimated]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	98	37	37	e80	101	90	34	140	128	38	33	39
2	97	40	39	e85	97	69	58	130	124	37	34	37
3	101	41	37	e85	85	56	106	128	107	32	31	35
4	100	41	36	e85	69	50	116	161	93	31	40	33
5	107	41	35	e90	59	43	122	141	89	34	37	32
6	117	39	38	e95	52	39	118	115	85	31	32	37
7	134	40	38	e100	48	35	112	106	77	31	45	36
8	134	40	38	e100	44	32	119	94	75	33	46	36
9	131	41	46	104	44	59	146	92	74	33	40	33
10	122	45	42	111	57	58	134	97	68	34	40	36
11	121	54	53	118	58	56	209	99	67	33	42	43
12	124	57	59	66	66	50	226	109	64	30	40	46
13	123	62	68	e60	75	33	208	115	60	34	38	56
14	120	62	86	e60	69	26	189	106	62	38	42	66
15	121	45	101	e80	61	25	177	100	63	37	34	85
16	98	41	96	e100	51	25	177	95	64	34	35	92
17	82	39	90	e105	48	25	e195	87	62	35	34	1,060
18	89	41	86	e110	45	25	194	81	62	36	38	17,400
19	82	40	81	e130	43	26	158	91	56	27	41	19,200
20	83	39	66	148	45	25	199	116	50	31	40	20,200
21	76	38	63	146	44	25	216	105	51	37	37	17,600
22	76	41	74	145	e65	26	190	110	88	31	40	14,200
23	77	54	82	145	57	33	153	124	67	24	36	12,000
24	80	61	86	145	81	39	134	147	61	34	35	10,900
25	80	61	80	149	101	52	133	146	51	60	31	11,100
26	68	56	63	146	110	43	130	131	56	48	32	8,690
27	52	45	e70	137	127	34	127	117	50	43	31	7,080
28	48	44	e65	125	107	28	140	103	43	51	29	6,590
29	47	41	e70	115	---	28	144	122	41	48	32	5,750
30	40	39	e70	102	---	27	133	117	39	35	35	4,850
31	41	---	e75	101	---	27	---	120	---	28	38	---
Total	2,869	1,365	1,970	3,368	1,909	1,209	4,497	3,545	2,077	1,108	1,138	157,362
Mean	92.5	45.5	63.5	109	68.2	39.0	150	114	69.2	35.7	36.7	5,245
Max	134	62	101	149	127	90	226	161	128	60	46	20,200
Min	40	37	35	60	43	25	34	81	39	24	29	32
Ac-ft	5,690	2,710	3,910	6,680	3,790	2,400	8,920	7,030	4,120	2,200	2,260	312,100

361,810
Ac Ft

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1902 - 2013, BY WATER YEAR (WY)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	299	335	401	512	579	512	514	994	1,426	311	178	284
Max	2,427	2,358	1,371	1,571	1,864	2,200	2,808	9,922	12,200	5,059	1,882	5,245
(WY)	(1985)	(1985)	(1985)	(1998)	(1930)	(1939)	(1983)	(1980)	(1983)	(1983)	(1997)	(2013)
Min	5.85	15.4	18.8	49.6	48.1	27.2	17.3	24.1	8.33	2.15	2.52	5.60
(WY)	(1904)	(2003)	(1912)	(2003)	(2005)	(2005)	(1904)	(1911)	(1910)	(1903)	(1902)	(1903)

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Water-Data Report 2014
06764000 SOUTH PLATTE RIVER AT JULESBURG, CO -- Continued

DISCHARGE, CUBIC FEET PER SECOND
YEAR 2013-10-01 to 2014-09-30
DAILY MEAN VALUES
[e, Value has been estimated.]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
	2013	2013	2013	2014	2014	2014	2014	2014	2014	2014	2014	2014
1	4,310	300	266	e423	e650	464	317	125	4,420	1,860	520	599
2	4,030	260	267	e391	e650	405	308	122	4,690	1,650	840	579
3	3,700	237	e260	e377	e625	300	292	143	4,960	1,340	1,860	543
4	3,400	242	e250	e392	e600	442	280	144	5,120	1,020	2,630	506
5	3,100	315	e250	e350	e550	527	262	139	5,580	815	2,280	478
6	2,800	336	e220	e300	e450	541	237	140	6,420	660	1,710	437
7	2,600	327	e170	e251	e400	566	215	130	7,850	464	1,330	391
8	2,560	345	e160	e253	e450	554	205	157	8,270	335	1,070	351
9	2,390	256	e110	e355	e501	544	192	160	8,990	275	836	291
10	2,170	217	e380	e461	e651	566	181	136	8,630	217	670	235
11	2,070	193	e540	e585	e1,200	603	169	139	7,810	173	534	253
12	1,820	180	e680	e708	e1,460	654	159	158	6,930	154	458	304
13	1,490	166	e880	e757	1,480	680	177	146	6,660	147	389	303
14	1,320	156	1,090	e852	1,460	660	203	148	6,120	182	323	298
15	1,240	148	1,130	e800	1,420	671	197	220	5,130	165	301	311
16	1,140	144	1,050	e800	1,270	639	187	515	4,560	157	308	317
17	1,000	147	958	e850	1,330	628	188	571	4,320	156	253	353
18	858	150	893	902	1,260	596	179	467	4,170	177	190	370
19	757	138	871	868	1,150	586	196	386	3,970	179	143	357
20	773	130	811	843	1,010	539	219	324	3,260	169	150	318
21	786	185	781	819	907	506	225	269	2,610	140	158	256
22	783	267	761	802	778	476	232	229	2,150	121	184	230
23	753	291	715	750	700	458	252	188	1,980	135	242	229
24	723	292	716	715	641	422	210	170	1,670	119	321	214
25	668	286	701	711	580	372	173	166	1,720	113	446	192
26	588	281	669	695	562	335	144	316	1,690	105	560	189
27	484	276	653	682	519	307	140	1,080	1,550	95	515	173
28	419	276	618	664	496	283	155	1,820	1,690	93	517	156
29	388	268	538	678		256	144	2,550	1,920	100	526	159
30	363	267	490	687		230	137	3,280	2,000	112	529	213
31	330		451	e650		255		4,060		281	567	
Total	49,810	7,076	18,330	19,370	23,750	15,070	6,175	18,600	136,800	11,710	21,360	9,605
Mean	1,607	236	591	625	848	486	206	600	4,561	378	689	320
Max	4310	345	1130	902	1480	680	317	4060	8990	1860	2630	599
Min	330	130	110	251	400	230	137	122	1550	93	143	156
Ac-ft	98,800	14,040	36,350	38,420	47,110	29,880	12,250	36,890	271,400	23,220	42,370	19,050

$\Sigma = 669,780 \text{ Ac-ft}$

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1902 - 2014, BY WATER YEAR (WY)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	311	334	403	513	581	512	511	991	1,455	312	183	285
Max	2,427	2,358	1,371	1,571	1,864	2,200	2,808	9,922	12,200	5,059	1,882	5,245
(WY)	(1985)	(1985)	(1985)	(1998)	(1930)	(1939)	(1983)	(1980)	(1983)	(1983)	(1997)	(2013)
Min	5.85	15.4	18.8	49.6	48.1	27.2	17.3	24.1	8.33	2.15	2.52	5.60
(WY)	(1904)	(2003)	(1912)	(2003)	(2005)	(2005)	(1904)	(1911)	(1910)	(1903)	(1902)	(1903)

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Water-Data Report 2015
06764000 SOUTH PLATTE RIVER AT JULESBURG, CO -- Continued

DISCHARGE, CUBIC FEET PER SECOND
YEAR 2014-10-01 to 2015-09-30
DAILY MEAN VALUES

[e, Value has been estimated.]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
	2014	2014	2014	2015	2015	2015	2015	2015	2015	2015	2015	2015
1	243	435	1,750	e1,980	1,690	643	318	1,870	13,600	5,060	965	140
2	303	423	1,750	e1,980	1,640	650	318	2,330	13,400	4,450	719	129
3	314	448	1,700	e1,980	1,630	706	333	2,480	12,800	3,830	556	120
4	422	519	1,670	e1,970	1,610	767	320	2,530	12,300	3,520	494	114
5	726	575	1,670	e1,970	1,580	860	289	2,590	12,200	3,120	419	112
6	911	643	1,670	e1,960	1,590	919	265	2,790	12,100	2,750	382	112
7	937	616	1,730	e1,950	1,620	814	243	2,980	12,100	2,390	308	109
8	936	620	1,750	e1,950	1,610	660	225	3,420	12,300	2,120	294	119
9	845	614	1,720	e1,940	1,540	601	229	4,300	12,800	2,020	311	118
10	767	793	1,690	e1,930	1,420	553	215	5,500	13,900	1,970	318	107
11	689	1,300	1,670	e1,930	1,330	489	178	6,670	15,000	2,030	425	107
12	589	1,710	1,620	e1,940	1,280	437	169	8,450	15,100	2,630	429	117
13	470	2,070	1,570	e1,950	1,110	512	161	10,400	14,600	3,230	370	132
14	416	2,050	1,590	e1,950	875	603	170	12,800	14,000	3,110	288	154
15	483	2,180	1,620	e1,960	762	631	183	16,200	13,500	2,620	270	170
16	499	2,340	1,590	e1,970	684	618	182	16,400	13,500	2,360	264	205
17	595	2,350	1,590	e1,980	592	577	180	14,600	14,500	2,210	246	233
18	627	2,300	1,640	e1,870	493	516	e173	13,100	15,400	2,110	267	253
19	616	1,980	1,760	e1,930	448	446	178	12,400	14,000	1,910	256	280
20	604	1,740	1,800	e1,980	422	401	209	12,400	12,900	1,750	243	293
21	588	1,710	1,810	e1,950	400	365	247	12,000	12,200	1,750	253	304
22	566	1,720	1,840	e1,850	393	315	569	11,400	12,100	1,800	294	295
23	541	1,730	1,840	e1,850	373	283	599	11,100	11,700	1,830	327	268
24	499	1,760	1,850	e1,850	361	274	527	12,400	11,200	1,870	329	238
25	458	1,770	1,880	e1,850	367	271	435	14,400	10,500	1,930	298	212
26	454	1,770	1,910	e1,840	488	303	493	15,000	9,470	1,990	267	220
27	434	1,770	1,950	1,850	545	340	673	14,400	8,000	1,890	233	231
28	478	1,760	1,960	1,840	592	337	731	14,700	7,130	1,750	208	240
29	481	1,770	2,000	1,810		333	921	14,900	6,760	1,500	184	240
30	449	1,760	e1,980	1,770		339	1,180	14,400	5,820	1,280	165	263
31	424		e1,980	1,730		315		14,100		1,140	154	
Total	17,360	43,230	54,550	59,260	27,450	15,880	10,910	303,000	364,900	73,920	10,540	5,635
Mean	560	1,441	1,760	1,912	980	512	364	9,775	12,160	2,385	340	188
Max	937	2350	2000	1980	1690	919	1180	16400	15400	5060	965	304
Min	243	423	1570	1730	361	271	161	1870	5820	1140	154	107
Ac-ft	34,440	85,740	108,200	117,500	54,440	31,490	21,650	601,000	723,700	146,600	20,900	11,180

2015
1,956,840 Ac-ft
2014
669,780 Ac-ft
2013
361,810 Ac-ft

3 year Total
2,988,430 Ac-ft

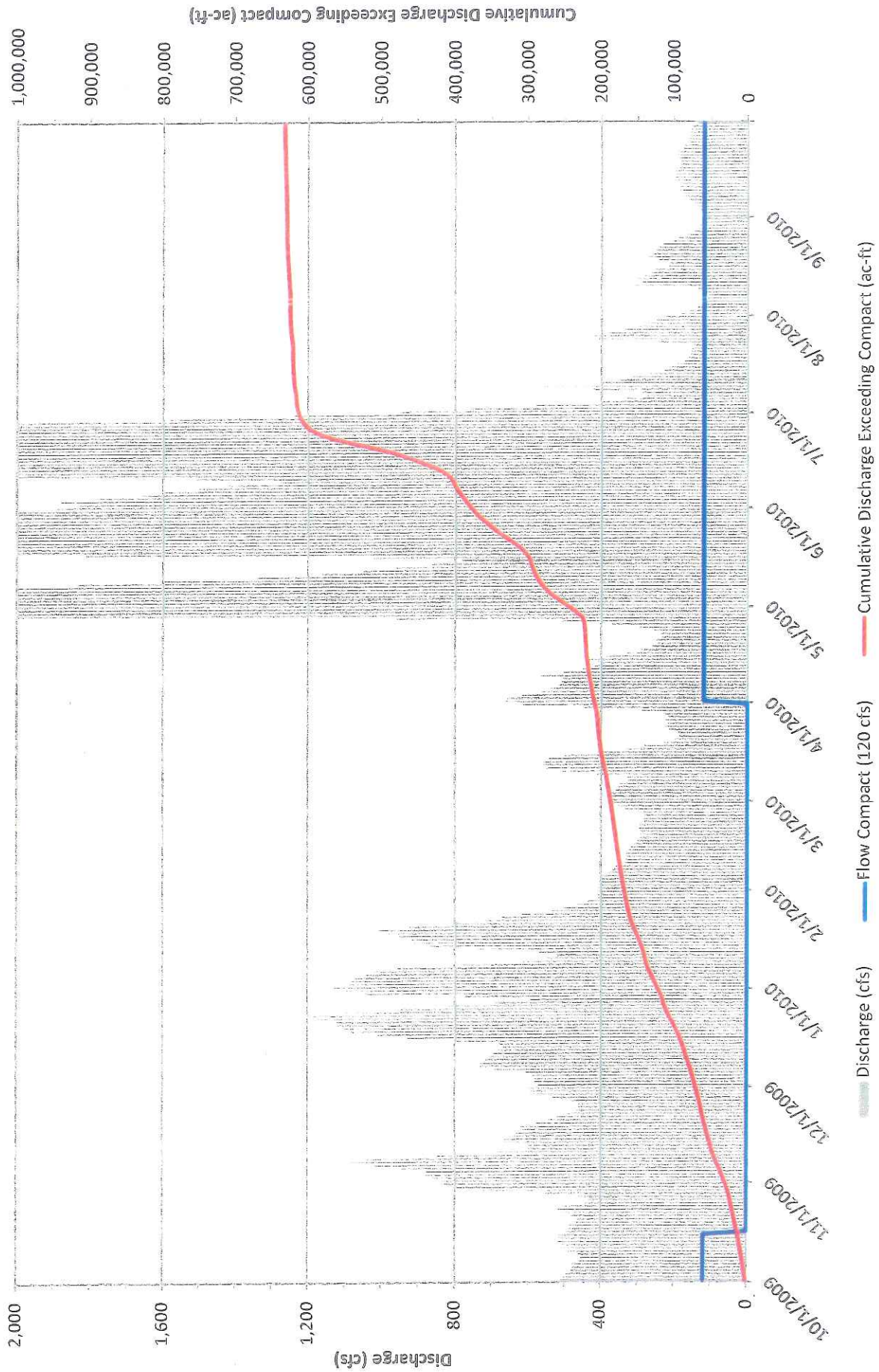
$\Sigma = 1,956,840 \text{ Ac-ft}$

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1902 - 2015, BY WATER YEAR (WY)

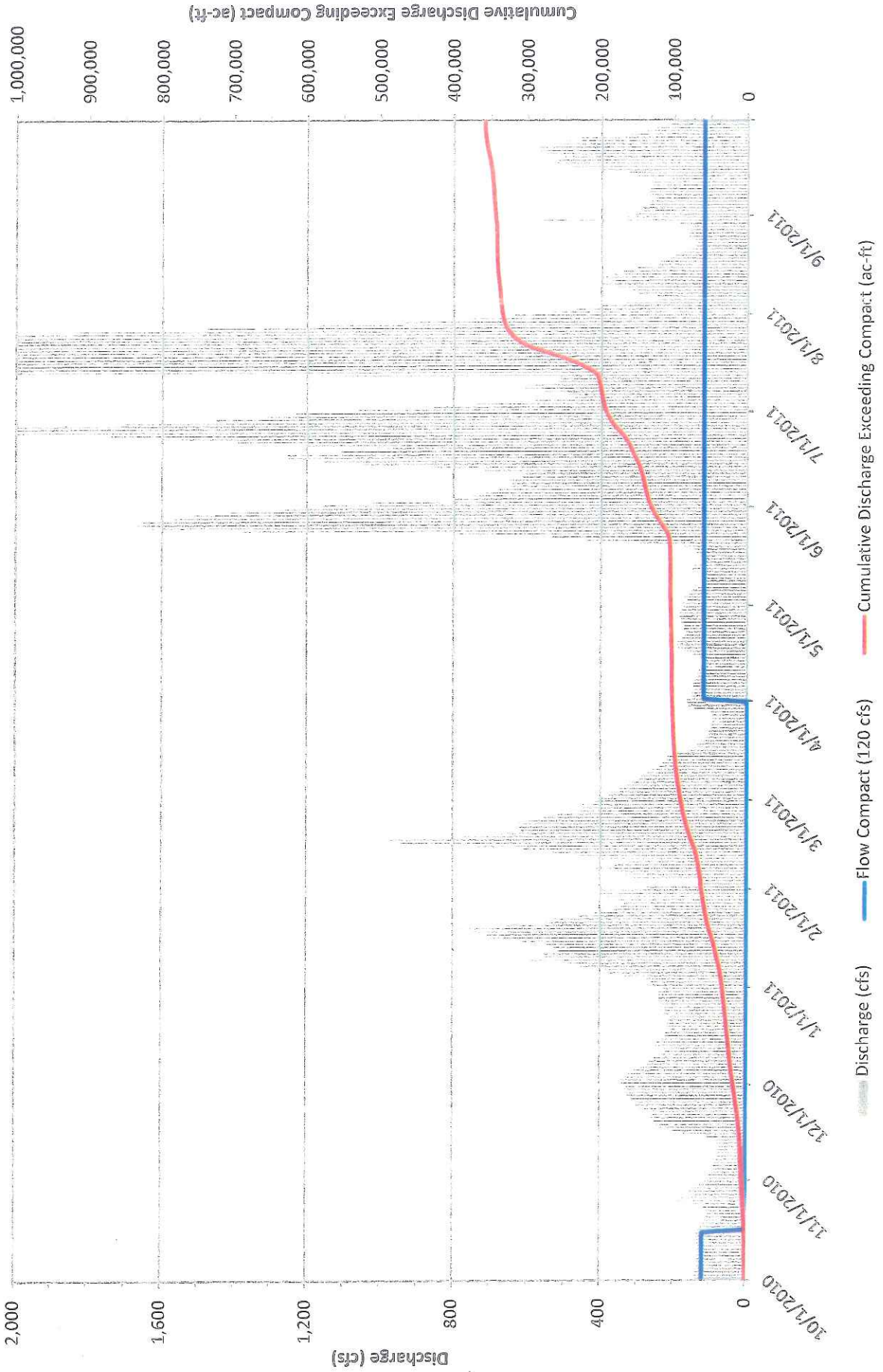
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	313	345	415	526	585	512	510	1,071	1,554	331	185	284
Max	2,427	2,358	1,760	1,912	1,864	2,200	2,808	9,922	12,200	5,059	1,882	5,245
(WY)	(1985)	(1985)	(2015)	(2015)	(1930)	(1939)	(1983)	(1980)	(1983)	(1983)	(1997)	(2013)
Min	5.85	15.4	18.8	49.6	48.1	27.2	17.3	24.1	8.33	2.15	2.52	5.60
(WY)	(1904)	(2003)	(1912)	(2003)	(2005)	(2005)	(1904)	(1911)	(1910)	(1903)	(1902)	(1903)

Water Year (10/1-9/30)	Cumulative Discharge Exceeding Compact (ac-ft)		
	Total	Not Irr. Season (10/1-3/31)	Irr. Season (4/1-9/30)
1990	235,276.8	171,844.5	63,432.3
1991	228,062.8	161,000.7	67,062.1
1992	329,336.4	212,442.8	116,893.6
1993	323,768.7	251,293.6	72,475.1
1994	212,605.4	204,711.1	7,894.3
1995	1,116,018.3	64,963.6	1,051,054.7
1996	384,326.9	237,036.2	147,290.7
1997	717,632.3	216,030.9	501,601.4
1998	676,675.0	426,718.3	249,956.7
1999	956,882.1	239,370.8	717,511.3
2000	403,664.1	375,331.8	28,332.3
2001	148,177.4	88,906.4	59,270.9
2002	81,327.5	80,873.2	454.2
2003	12,258.0	11,502.3	755.7
2004	14,152.3	14,152.3	-
2005	83,679.9	20,910.1	62,769.8
2006	38,422.4	37,113.3	1,309.1
2007	89,465.8	28,334.3	61,131.5
2008	61,686.9	58,606.5	3,080.4
2009	253,753.1	45,999.3	207,753.8
2010	632,883.3	207,892.6	424,990.7
2011	358,218.1	101,533.4	256,684.7
2012	239,761.5	237,024.3	2,737.2
2013	331,613.4	21,798.7	309,814.8
Average	330,402.0	146,474.6	183,927.4

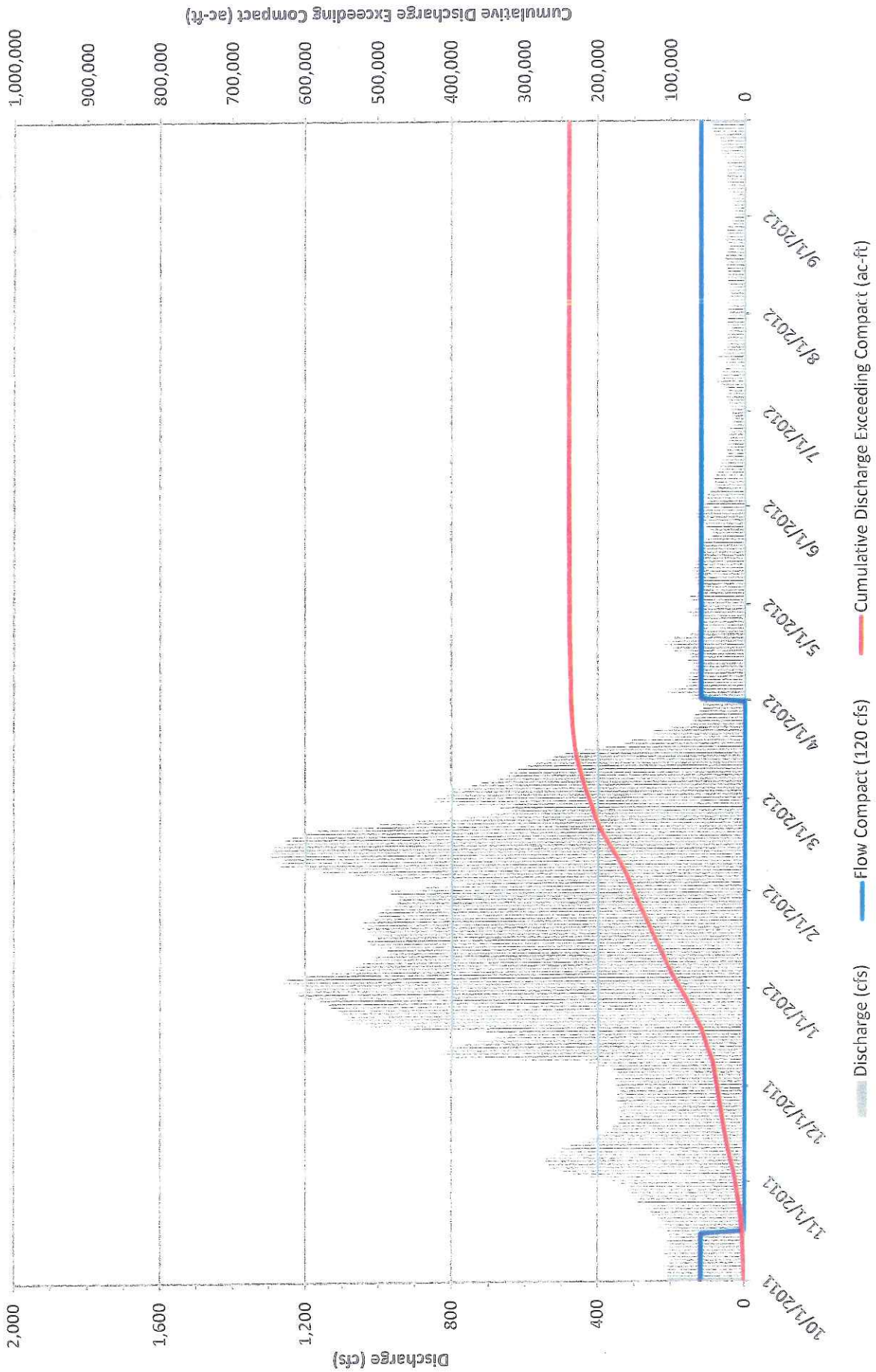
Julesburg Gauge 2010 Water Year



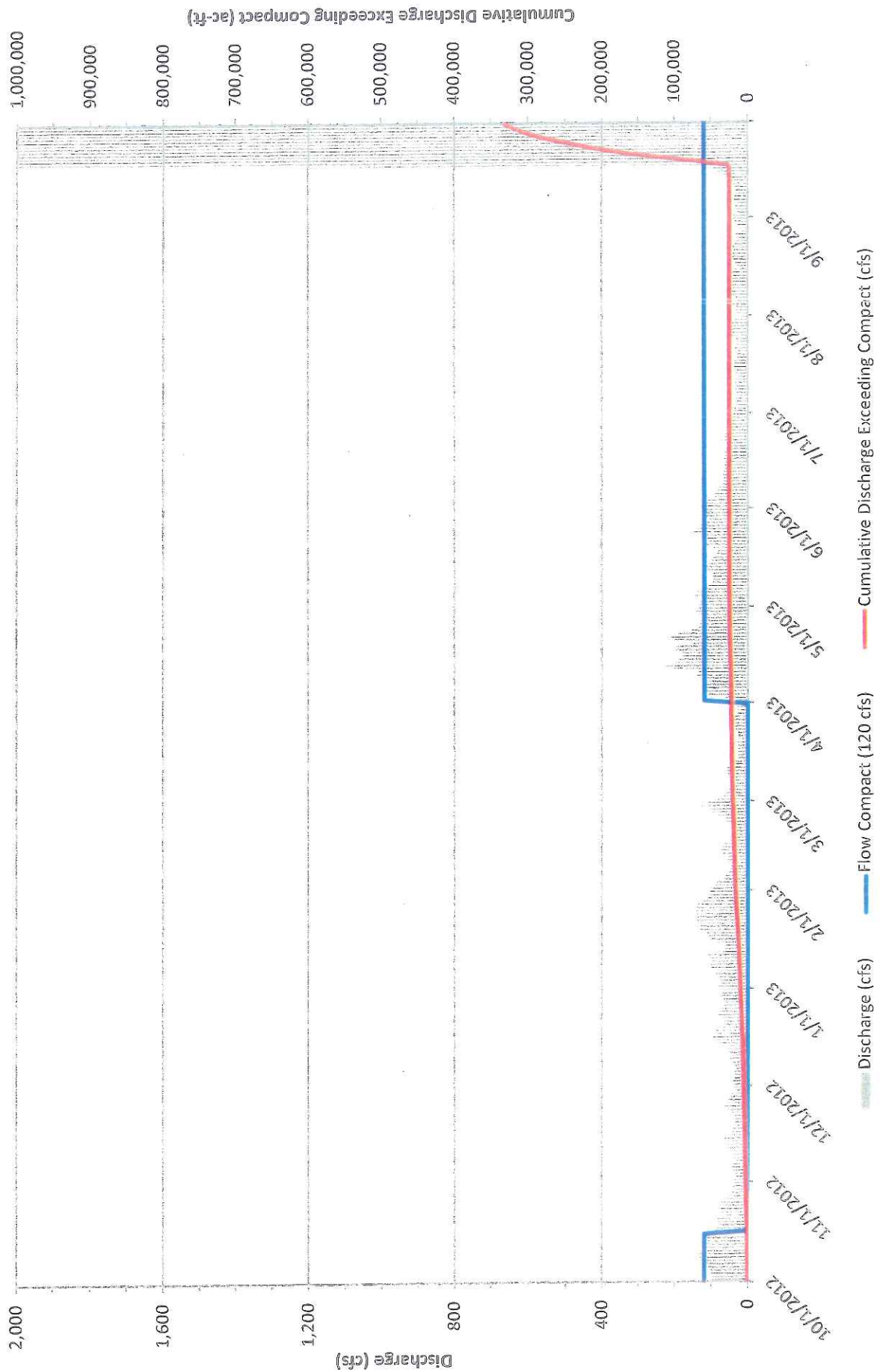
Julesburg Gauge 2011 Water Year



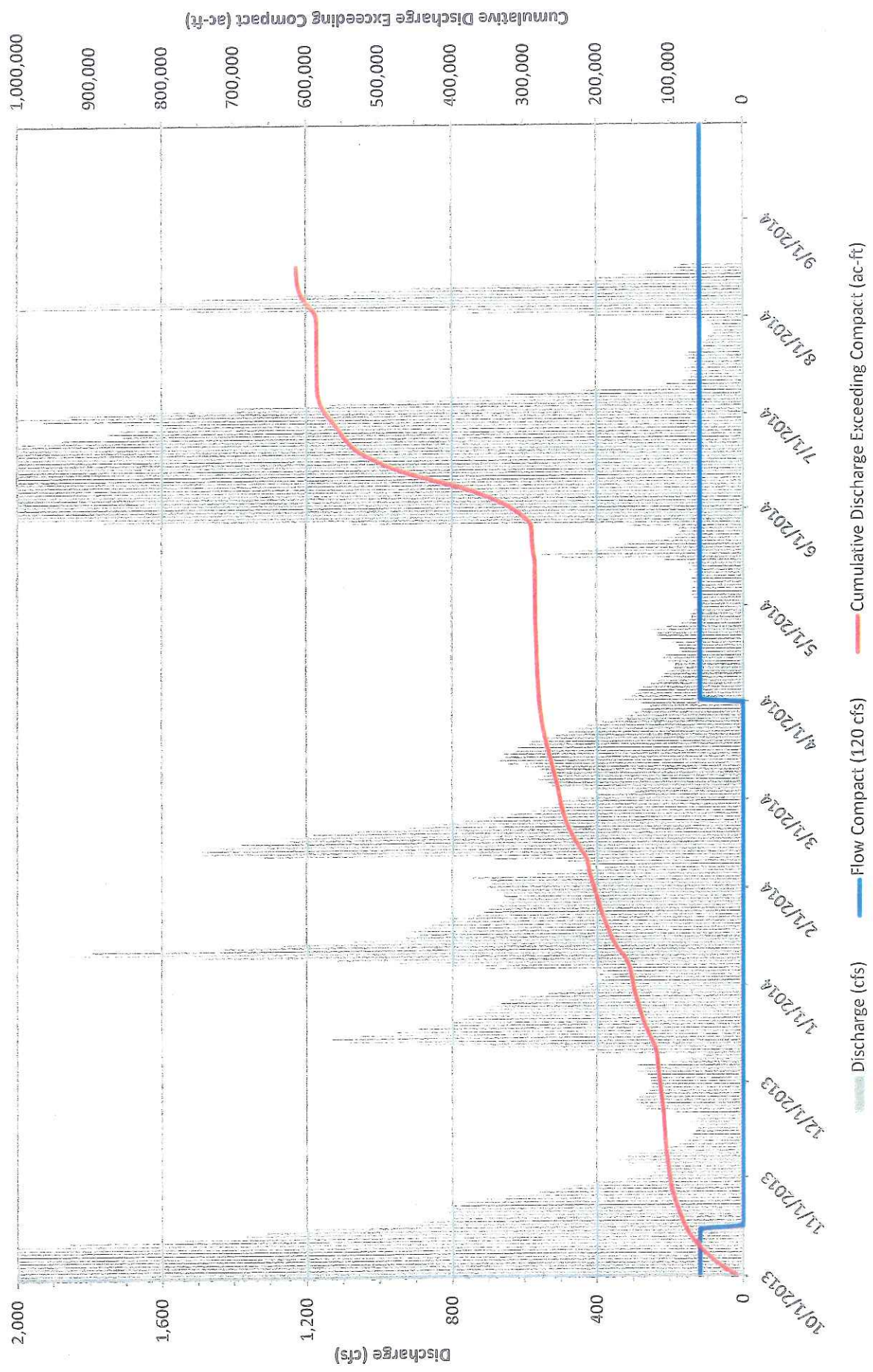
Julesburg Gauge 2012 Water Year



Julesburg Gauge 2013 Water Year

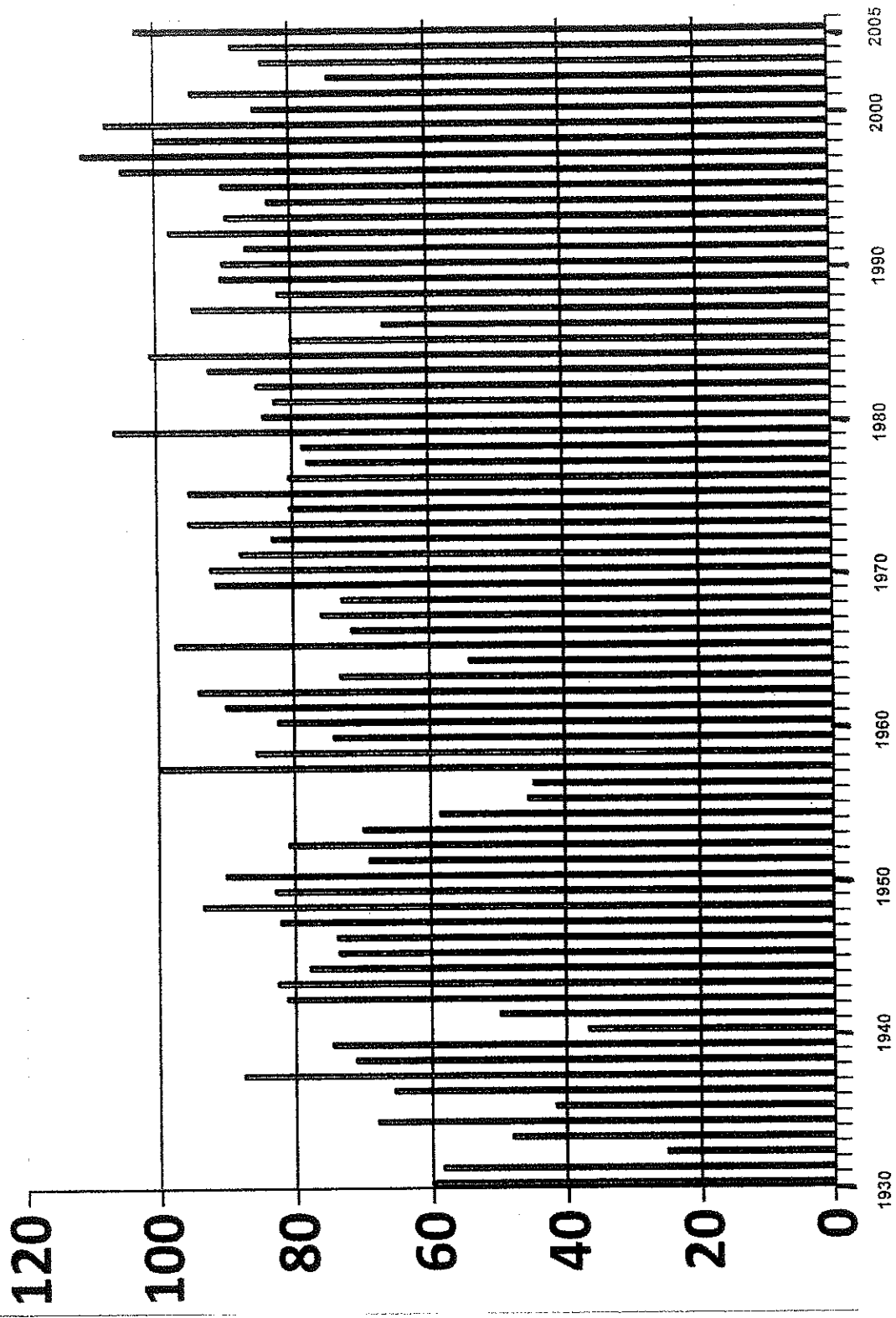


Julesburg Gauge 2014 Water Year (Provisional Data)



from Gene / 2/18/2015

NORTH STERLING IRRIGATION DISTRICT WATER SUPPLY AND DELIVERY RECORDS



Water Delivery
per
one thousand
acre feet

Annual Deliveries 1930 - 2005

