

Fixed-point and Offsite-point Recharge and Discharge for Calibration of Eastern Snake Plain Aquifer Model Version 2, As Built

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DESIGN DOCUMENT OVERVIEW

During calibration of the Eastern Snake Plain Aquifer Model Version 1.1 (ESPAM1.1), a series of Design Documents were produced to document data sources, conceptual model decisions and calculation methods. These documents served two important purposes; they provided a vehicle to communicate decisions and solicit input from members of the Eastern Snake Hydrologic Modeling Committee (ESHMC) and other interested parties, and they provided far greater detail of particular aspects of the modeling process than would have been possible in a single final report. Many of the Design Documents were presented first in a draft form, then in revised form following input and discussion, and finally in an “as-built” form describing the actual implementation.

This report is a Design Document for the calibration of the Eastern Snake Plain Aquifer Model Version 2 (ESPAM2). Its goals are similar to the goals of Design Documents for ESPAM1.1: To provide full transparency of modeling data, decisions and calibration; and to seek input from representatives of various stakeholders so that the resulting product can be the best possible technical representation of the physical system (given constraints of time, funding and personnel). It is anticipated that for some topics, a single Design Document will serve these purposes prior to issuance of a final report. For other topics, a draft document will be followed by one or more revisions and a final “as-built” Design Document. Superseded Design Documents will be maintained in a “superseded” file folder on the project Website, and successive versions will be maintained in a “current” folder. This will provide additional documentation of project history and the development of ideas.

INTRODUCTION

The ESPAM1.1 recharge tools and algorithms included three mechanisms for representing fluxes between the aquifer that could be represented as single-point fluxes into or out of the aquifer. These were the Fixed-point data set, the Scenario-point data set and the Offsite-point data set.

The Fixed-point data set (intermediate file extension *.fpt) was designed to represent fluxes that did not enter into any other water-budget calculation. In ESPAM1.1 it was used for various components in the calibration water-budget, as described below. The recharge tools simply added the values to the volume for the appropriate model grid cell and stress period, without performing

calculations. Since the MODFLOW code represents all fluxes into or out of the aquifer as if they occurred exactly and only at the center of the model cell, a point data set can reasonably be used for any flux that occurs, even if in reality it is spatially distributed.

The Scenario-point data set (intermediate file extension *.scn) was also designed to represent fluxes that did not enter into any other water-budget calculations, but was intended specifically for hypothetical fluxes that might be considered in applying the model to scenarios to investigate hydrologic or management questions. Its treatment in the recharge tools and algorithms was identical to the Fixed-point data set, but it was not used in calibration of ESPAM1.1.

The Offsite-pumping data set (intermediate file extension *.off) was designed to represent pumping from wells that were distant from the irrigated place of use, where the water was *not* part of diversion data included in the diversions data sets. The calculation algorithms applied this water as a pumping withdrawal and also included it in canal-seepage and irrigated-lands calculations.

The Fixed-point and Offsite-point data sets are retained in ESPAM2 water-budget calculations, with essentially the same roles and definitions. This design document describes the particular water-budget components represented using these data sets and the details of the calculations.

REVIEW OF ESPAM1.1 APPROACH

Fixed-Point Data Set. In ESPAM1.1, the Fixed-point data set was used for the following water budget components:

- 1) Exchange wells. An exchange well is a well that is used to inject water into a natural water body, to replace or offset surface-water diversions that otherwise would have been out of priority. When the water is rediverted from the surface water body, it is included in the reported diversion volume. Therefore, no adjustment of diversion volume is needed. In ESPAM1.1 we represented Henrys Fork and Teton River exchange wells using data from Water District 01, and we represented exchange wells in the Mud Lake area using data from Water District 31.
- 2) Wetlands correction points. In ESPAM1.1, wetlands and evaporation open water were represented in the Recharge on Non-irrigated Lands data set. However, when wetlands/water and irrigated lands existed in a single model cell, the calculation underestimated the impact of wetlands/water. To correct this, additional extraction was calculated for those cells that contained both, and applied as a point extraction in the center of each affected cell.
- 3) Deficit-irrigation correction points. The ESPAM1.1 recharge-tool algorithms assumed the existence of supplemental wells to provide

adequate irrigation to satisfy crop evapotranspiration on all parcels. In a few locations, diversions were inadequate and supplemental wells did not exist. When water supplies were low, this resulted in an under-estimate of recharge from irrigation. To compensate, manually-calculated additional recharge was delivered to the water budget (Contor 2004b) at specific correction points in the Fixed Point data set.

Offsite Point Data Set. The Offsite-point data set was used in ESPAM1.1 to represent wells that delivered water directly into private canals, so that pumped volumes were not included in ESPAM1.1 diversion data. For Offsite-point wells, the recharge tools and algorithms performed two functions:

- 1) The pumpage volume was applied as an aquifer withdrawal from the corresponding model cell and stress period;
- 2) The pumpage volume was added to diversions for the identified Surface-water Irrigation Entity in the Diversions and Returns data set.
 - a. The addition occurred after the calculation of returns. Volumes of water applied in the Offsite-point data set did not affect returns.¹
 - b. The addition occurred prior to calculation of canal seepage. Volumes of water applied in the Offsite-point data would have increased canal seepage. However, none of the ESPAM1.1 leaky canals were in entities with offsite pumping represented.
 - c. The addition occurred prior to the irrigated-lands calculations, so that all Offsite-point pumping was available to satisfy crop ET on irrigated lands in the associated irrigation entity.

In ESPAM1.1, only the wells of the Jefferson Irrigation District, Montevieu Canal Company and Producers Canal Company were included in the Offsite-point data. These all are in Surface-water Irrigation Entity IESW044.

ESPAM2 APPROACH

Fixed Point Data Set. In ESPAM2, the Fixed-point data set is used to represent the following fluxes to or from the aquifer:

- 1) Exchange well pumping. Henrys Fork and Teton River exchange wells are represented using Water District 01 data. Mud Lake exchange wells are represented using data from Water District 31. Some refinement of well locations was made based on correspondence with the Watermaster of Water District 31 and with Water District 01 personnel.
- 2) Urban and industrial net extraction has been moved from the Non-irrigated lands data set to the Fixed-point data set. Estimation methods and geographic locations are retained from ESPAM1.1 (Contor 2002 and

¹ This does not mean groundwater contributions to returns were neglected in ESPAM1.1, because groundwater contributions were implicit in the data used to calculate return-flow fractions (Contor 2004b, appendix). This was true for returns associated with supplemental wells and exchange wells as well as offsite wells.

- 2004a). Estimated extraction depths based on USGS reports (Goodell 1988) were applied as an extraction, offset by precipitation depths from PRISM (Gilliland 2003) applied as recharge. The net depth was multiplied by GIS area in each model cell to obtain a volume of net extraction (negative) or recharge.
- 3) Wetlands/water net recharge and discharge have been moved from the Non-irrigated Lands data set to the Fixed-point data set. This removes the need for wetlands/water corrections points. For each model cell, net recharge is calculated as [precipitation depth – evapotranspiration depth] x [wetland area]. When precipitation exceeds evapotranspiration (some winter months), net recharge is positive and represents water flowing into the aquifer. In most summer months, net recharge is negative and represents aquifer discharge through evaporation or phreatophyte evapotranspiration.

Precipitation depths are obtained from PRISM data (Gilliland 2003) updated through 2008. Evapotranspiration depths are from ET Idaho (Allen 2010). Wetlands/water polygons are posted on the IDWR Website (IDWR 2010a) and are based on data sources used in ESPAM1.1 (Contor 2004a).

Wetlands/water areas are subdivided into “included” and “excluded” categories. “Excluded” wetlands/water are those where flux between the aquifer and the wetland is part of the Snake River gains and losses that are used as model calibration targets. These are not represented as part of the model input, but are calculated as one of the model outputs. “Included” wetlands/water are those away from the Snake River whose flux is part of the calculated model input. In Figure 3, excluded wetlands/water are colored red and included wetlands/water are colored blue. Only included wetlands/water are represented in the ESPAM2 Fixed-point data.

Included wetlands are further divided into “narrow” and “wide” wetlands, corresponding to two different evapotranspiration calculations in the ET data (Allen 2010). The determination was made by visual inspection in GIS. Figure 4 illustrates narrow and wide wetlands in part of the study area.

- 4) The Fixed-point data set is *not* used to adjust for deficit irrigation in ESPAM2. Deficit irrigation is addressed in the On-Farm algorithm of the MKMOD software.²

Figure 5 through Figure 10 illustrate the Fixed-point locations.

² It is anticipated that IDWR, Principia Mathematica and/or Spronk Water Engineers will produce a Design Document describing this software and the underlying algorithms and assumptions.

Offsite Point Data Set. Offsite-point data are used in ESPAM2 to represent the IESW044 (Monteview) wells that were represented in ESPAM1.1, along with a well in IESW016 (Egin) that was neglected in ESPAM1.1. Withdrawals for IESW044 were estimated based on evapotranspiration requirements, estimated canal seepage and estimated consumptive-use fraction of water applied at the field headgate. Withdrawals for IESW016 were estimated based on the diversion hydrographs, assuming that water would have been diverted from the exchange well during months with exceptionally low surface diversions. Estimated volumes were constrained by the well capacity indicated on the water right.

In ESPAM2, return flows are calculated internally within the MKMOD recharge-calculation software, based on the algorithms and parameters of the On-Farm routine. The return-flow calculation is performed after the offsite pumping is added to diversion volume. This differs from ESPAM1.1, where return flows were calculated prior to addition of Offsite Pumping volumes.

Figure 1 and Figure 2 (figures follow the text) illustrate the locations of Offsite-point wells. Flux values are listed in Appendix A.

DESIGN DECISION

The Offsite-point data set will be used to represent pumping into canals in entity IESW044 (Monteview) and IESW016 (Egin). The geographic location of wells is defined by data set *espam2_offsite_9_14_09.shp* (IDWR 2010b) as illustrated in Figure 1 and Figure 2. Flux (as of Fall 2010) is defined in Appendix A.

The Fixed-point data set will be used to represent net recharge from exchange wells, wetlands and urban/industrial areas. Shapefile *espam2_fixedpoint_08-03-10.shp* (IDWR 2010a) defines the location of points, as illustrated in Figure 5 through Figure 10. Flux (as of Fall 2010) is tabulated in Appendix B.

Any updates in geographic locations or flux estimates may be found at http://www.idwr.idaho.gov/Browse/WaterInfo/ESPAM/model_files/Version_2.0_Development/Current_Data/.

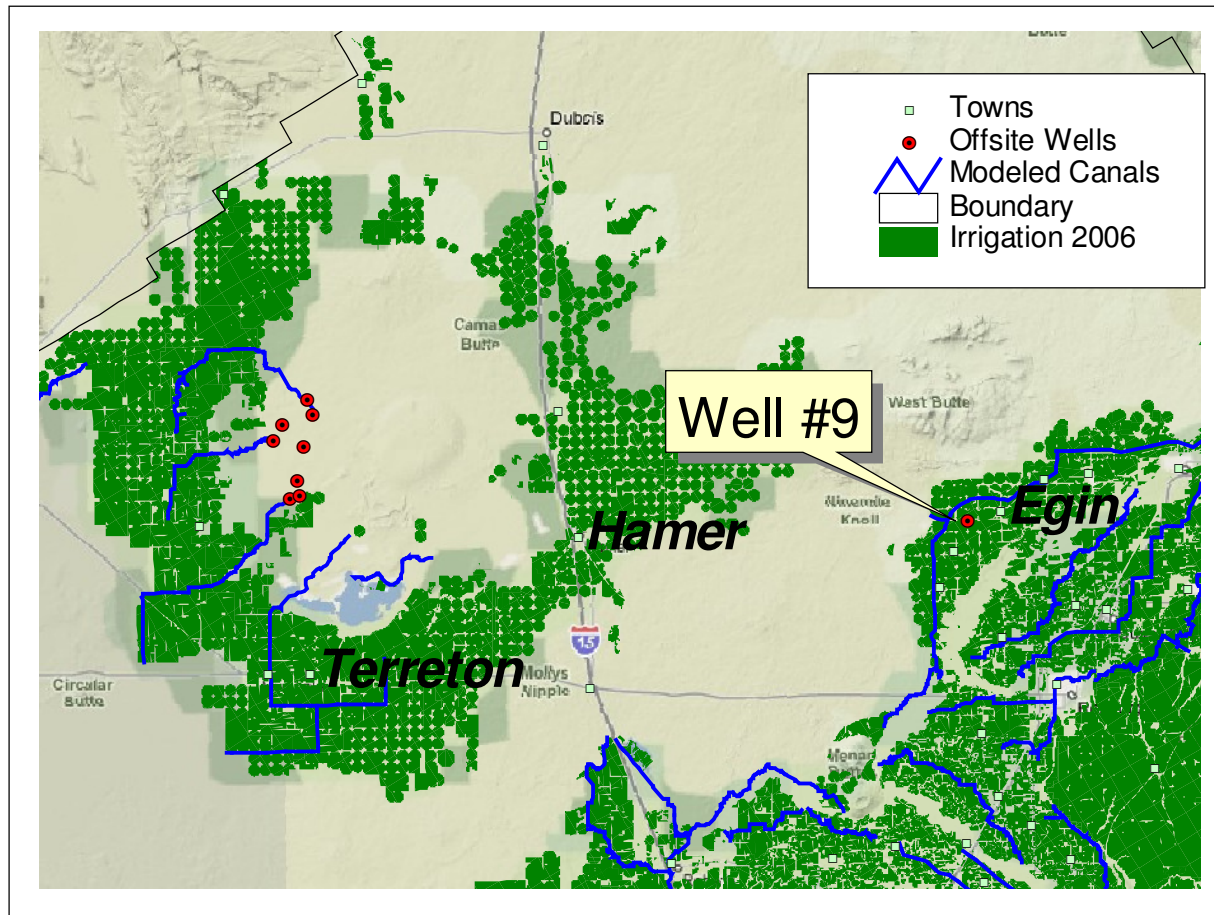


Figure 1. ESPAM2 Offsite-point wells in data set *espam2_offsite_9_14_09.shp* (IDWR 2010b).

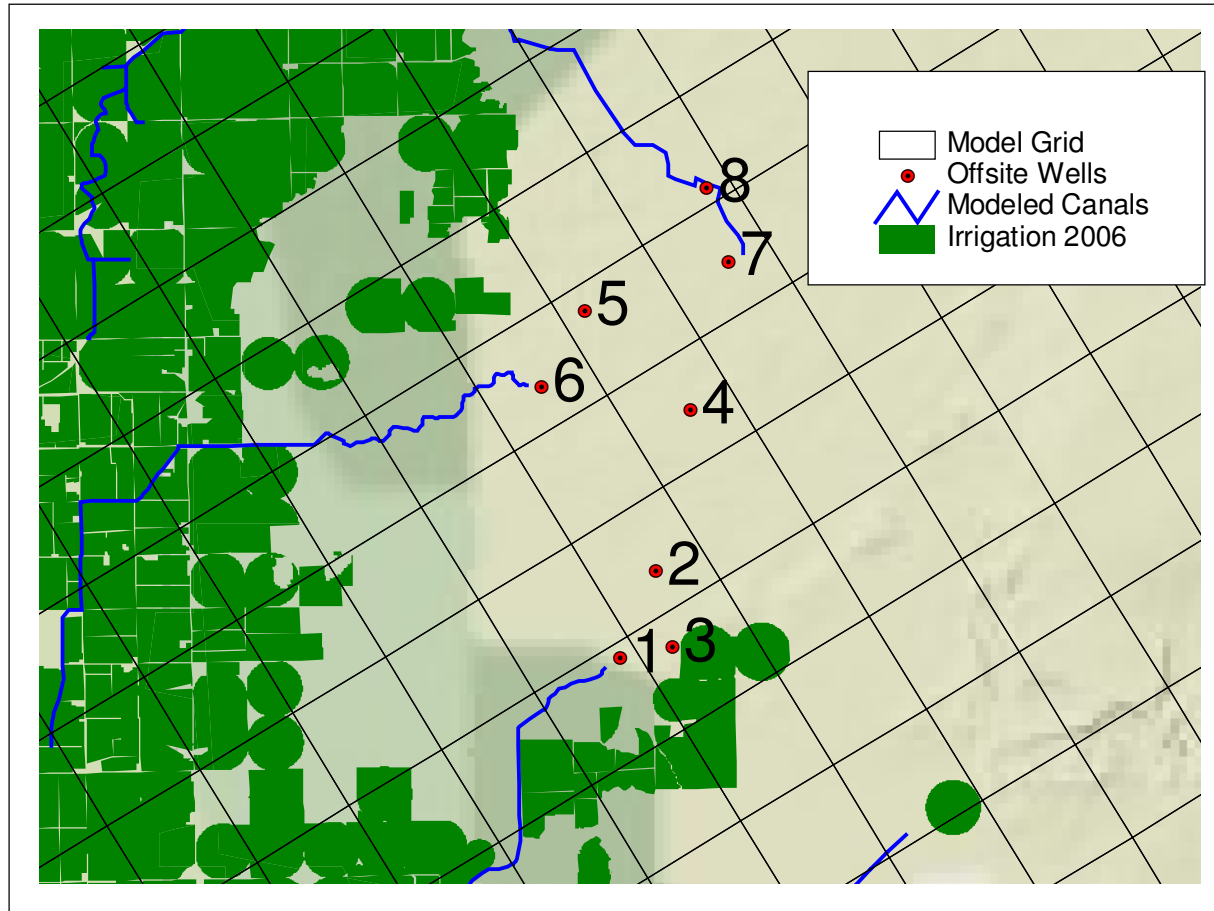


Figure 2. Close-up of ESPAM2 Offsite-point wells in the Montevieu area.

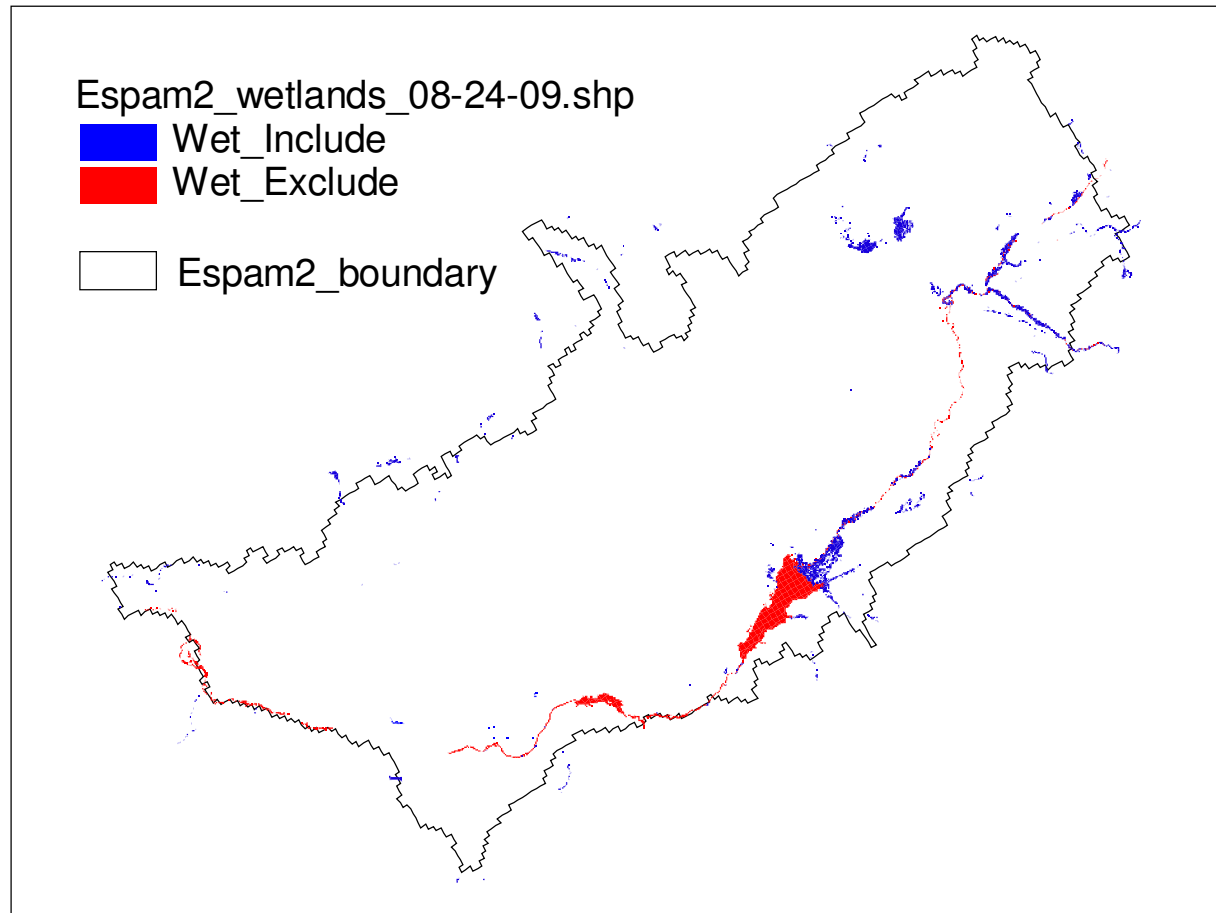


Figure 3. ESPAM2 representation of wetlands.

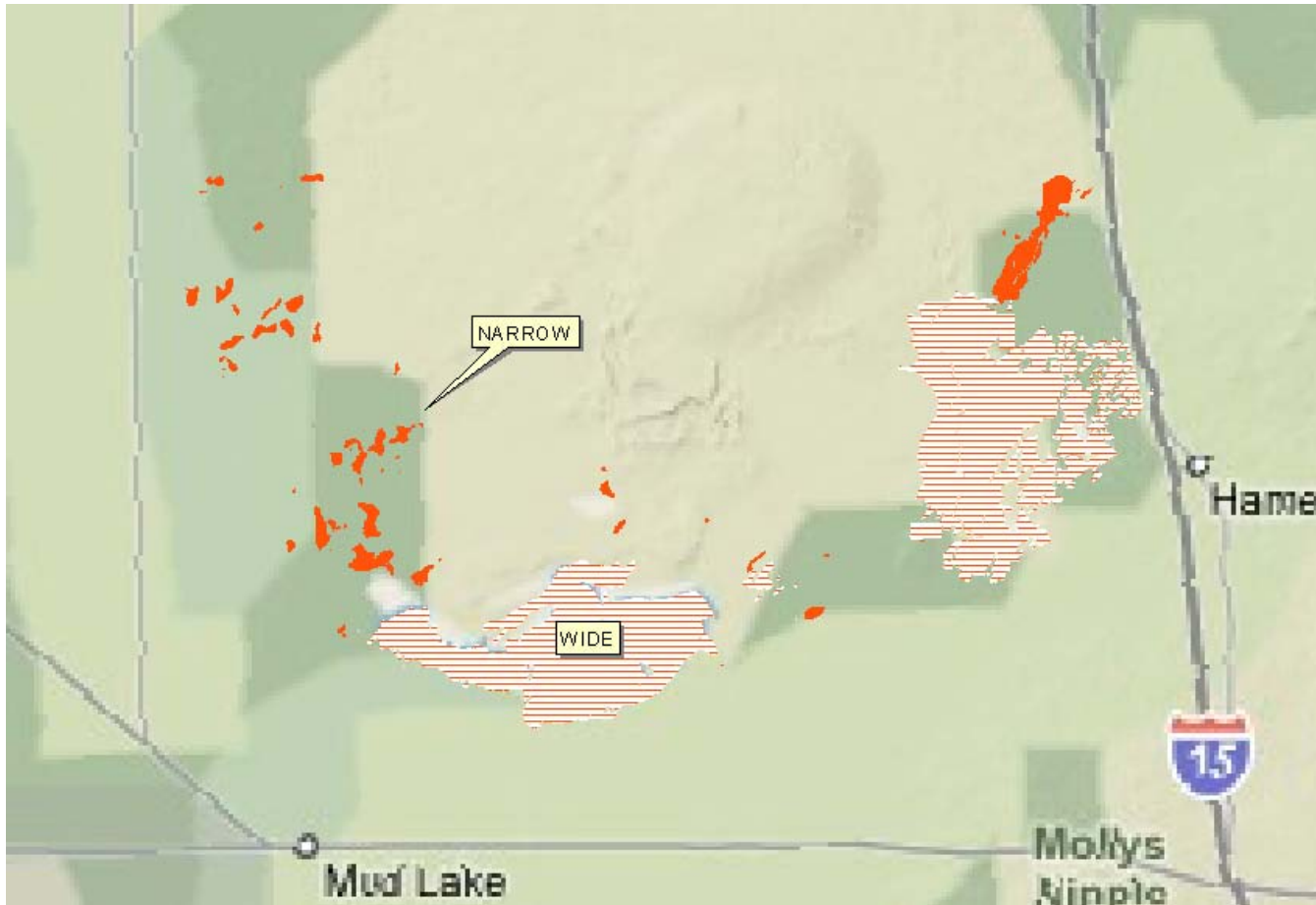


Figure 4. Wide (striped) and narrow (solid) wetlands in a sample area.

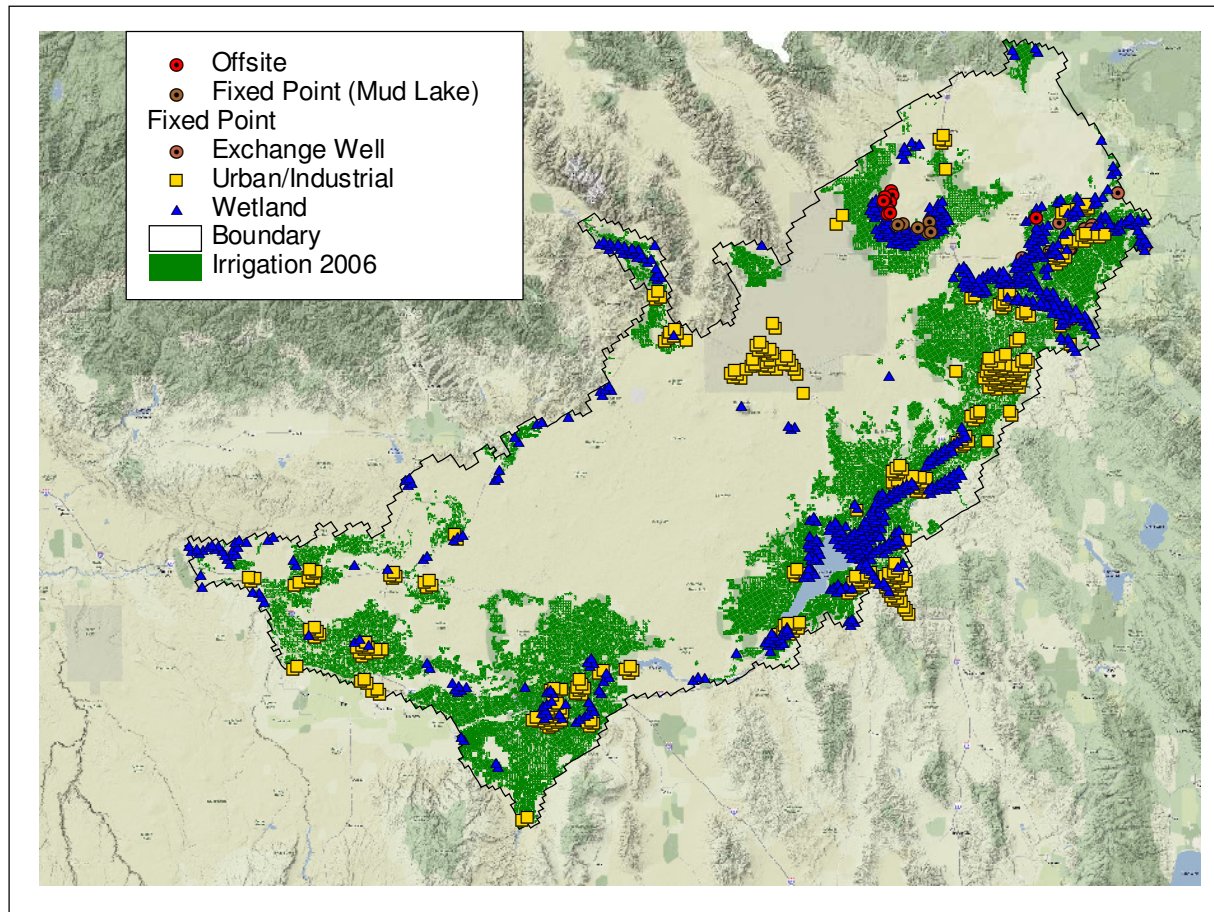


Figure 5. Fixed-points from data sets *espam2_fixedpoint_08_03_10.shp*. The Mud Lake fixed points are also exchange wells. Note that some wetlands adjacent to Snake River waters are included because they appear to be separate from the channel in which target gains and losses are calculated.

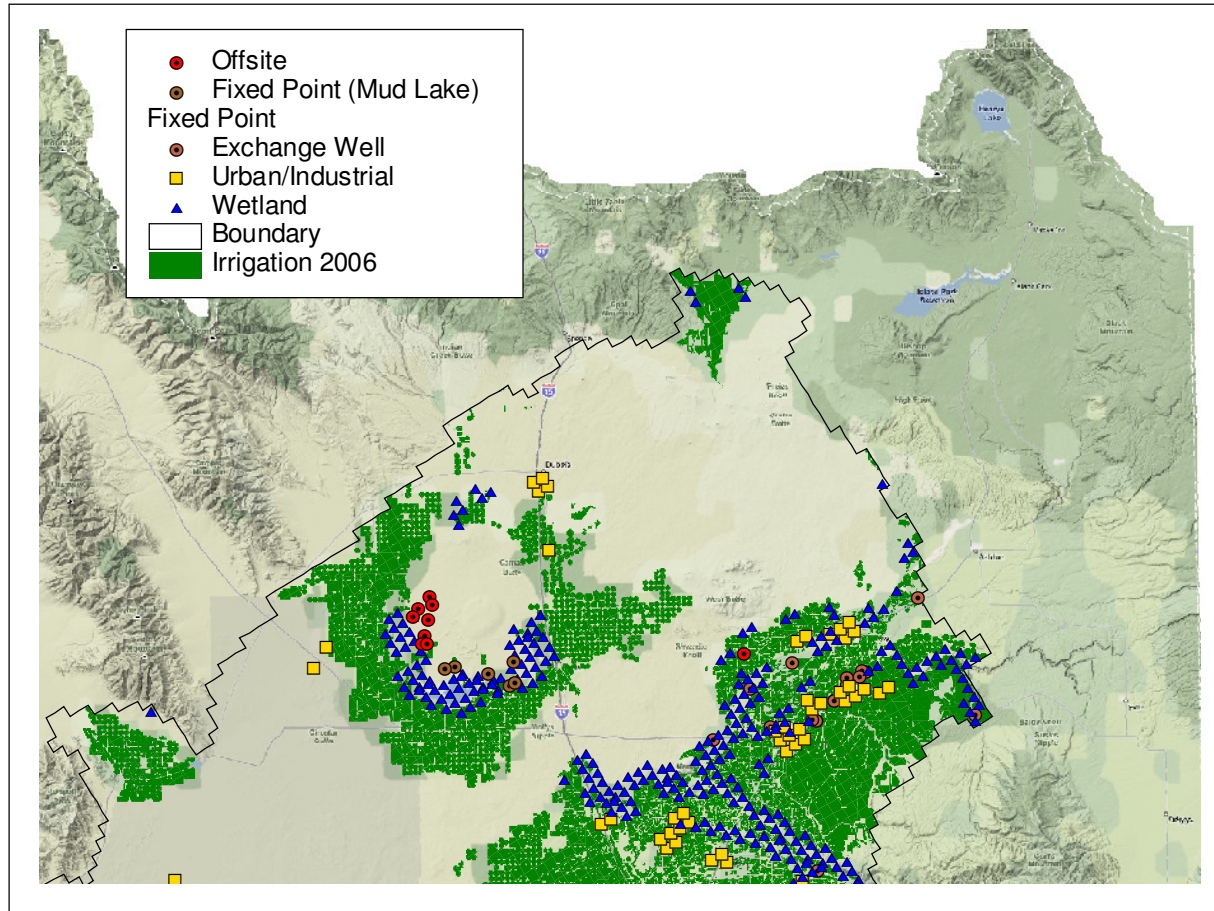


Figure 6. Close-up of fixed points in the northeast.

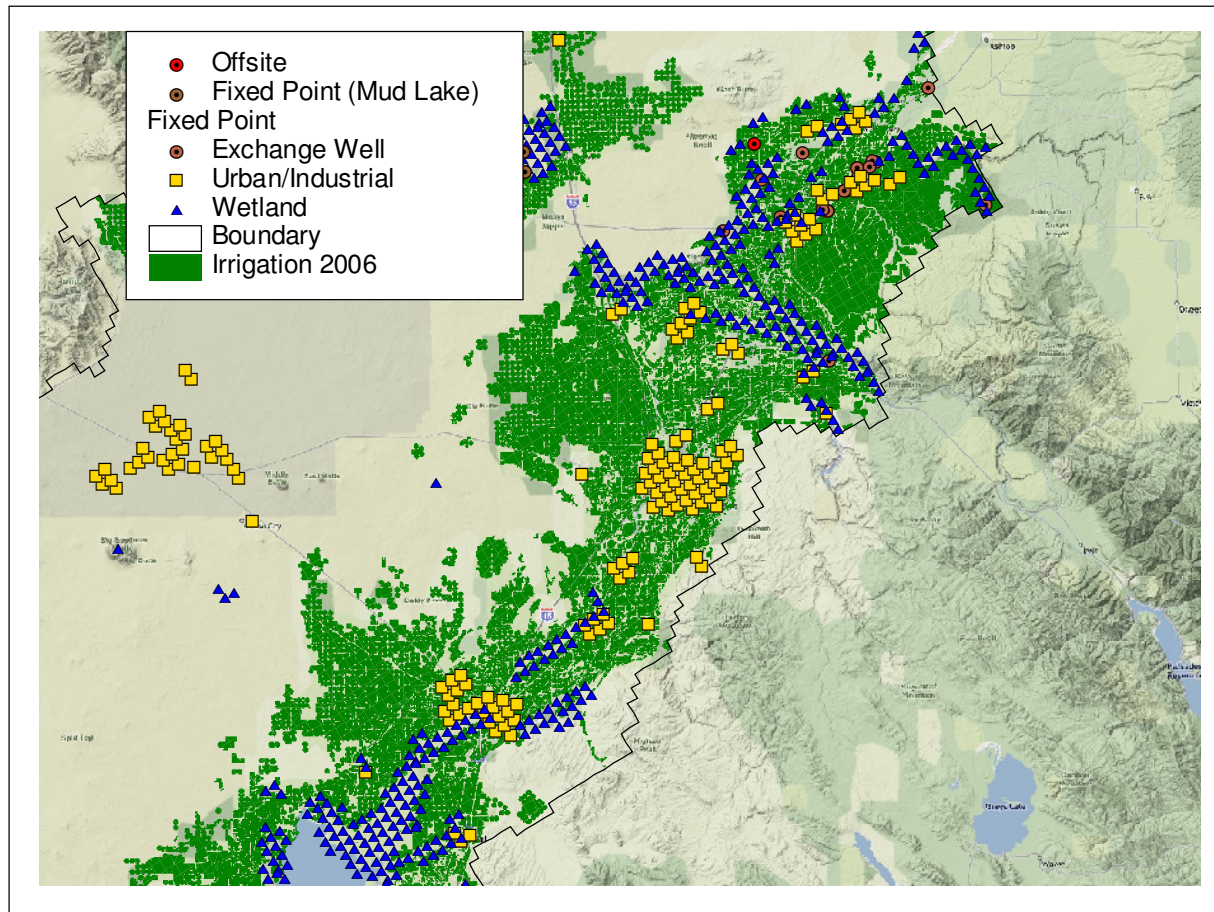


Figure 7. Close-up of fixed points in the east central part of the study area.

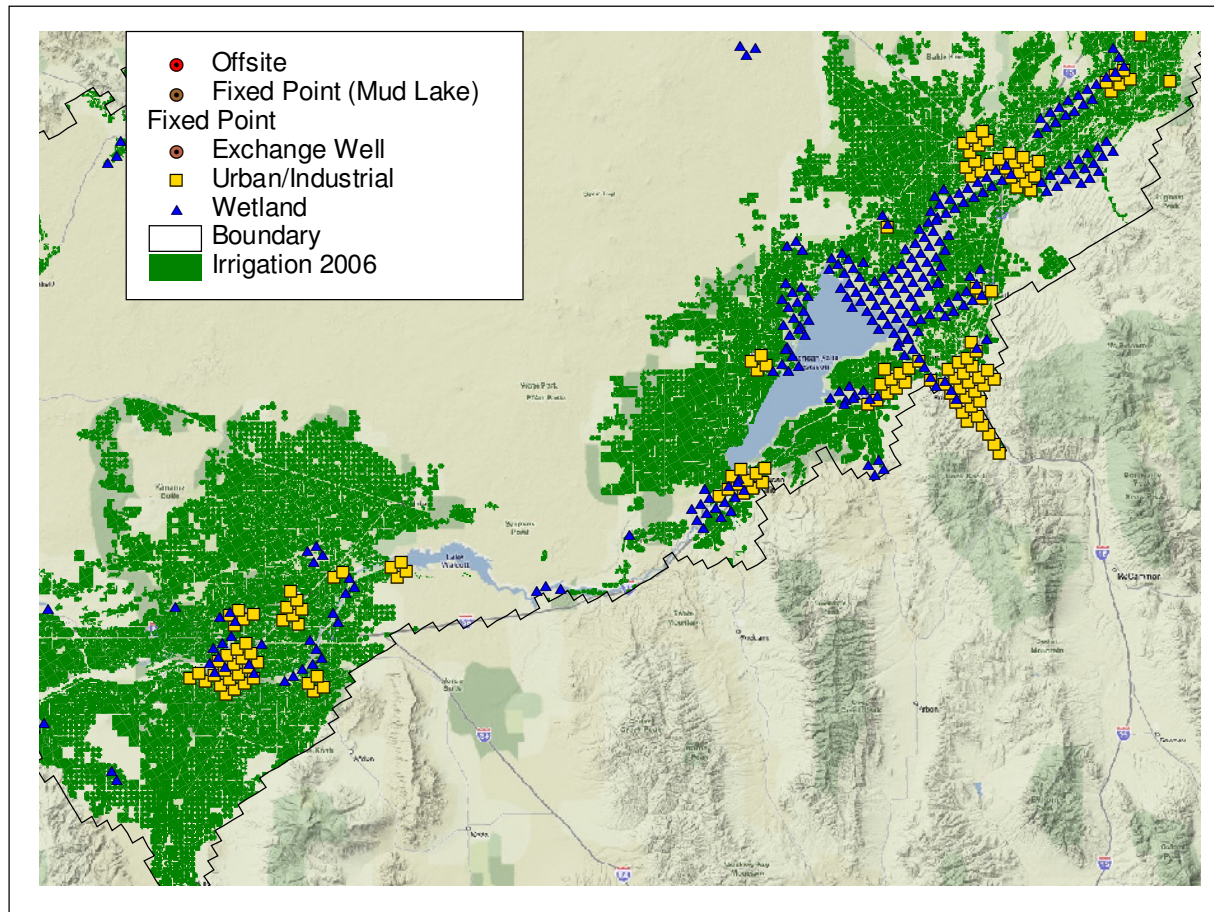


Figure 8. Fixed points in the south central part of the study area.

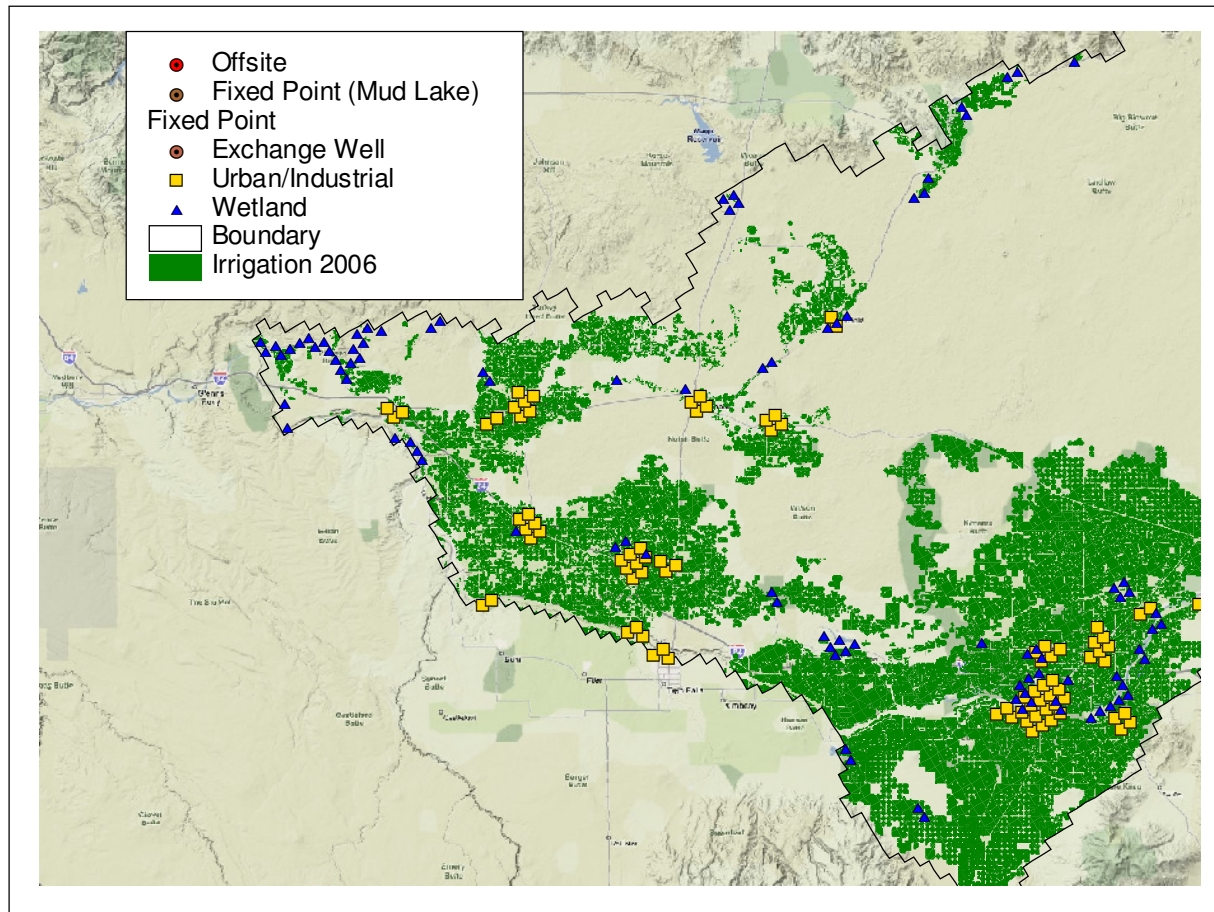


Figure 9. Fixed-points in the southwest.

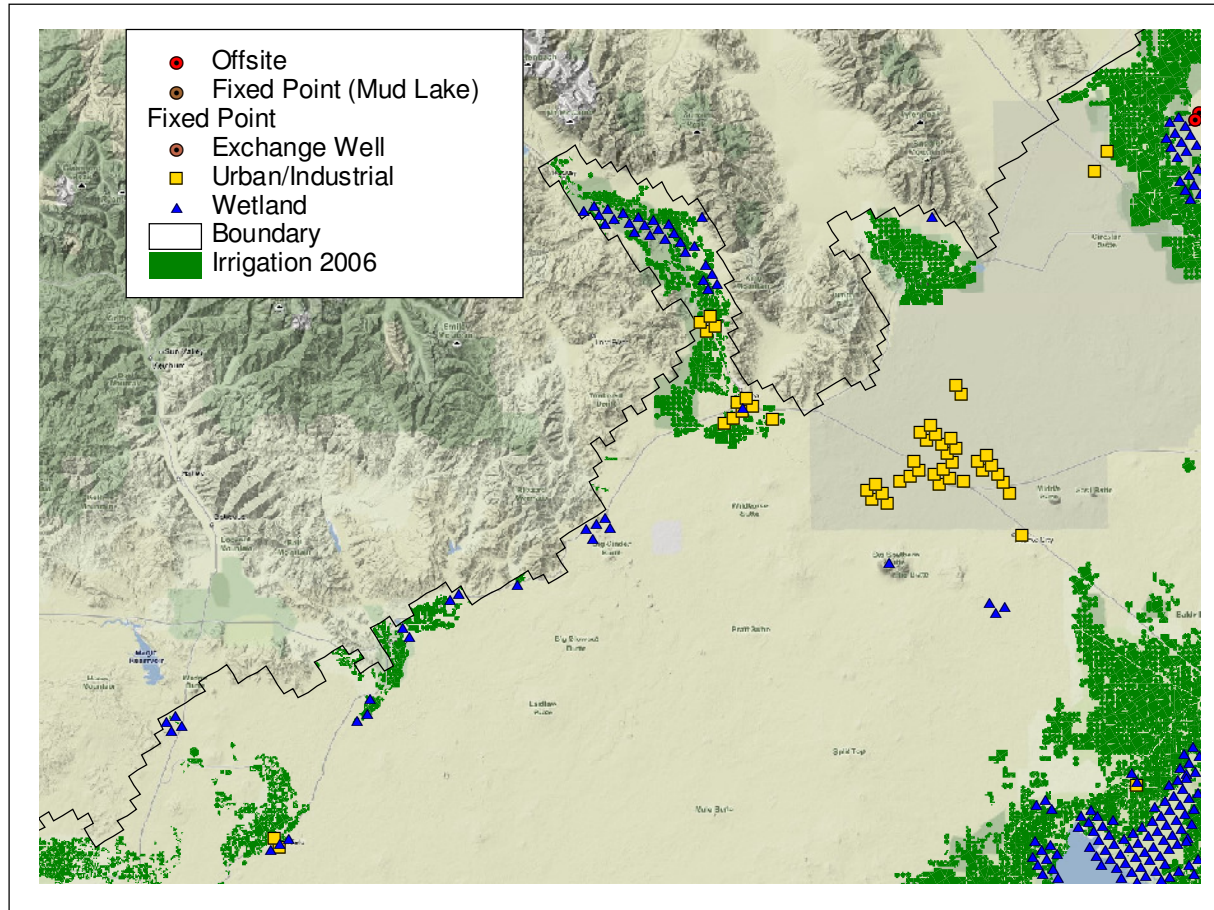


Figure 10. Fixed points in the north central part of the study area.

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Point	Cell	S013 1981 May	S014 1981 Jun	S015 1981 Jul	S016 1981 Aug	S017 1981 Sep	S018 1981 Oct	S019 1981 Nov	S020 1981 Dec	S021 1982 Jan	S022 1982 Feb	S023 1982 Mar	S024 1982 Apr
044 Well1	1034159	-1029	-2462	-3333	-2324	-540	0	0	0	0	0	0	-114
044 Well2	1035158	-1029	-2462	-3333	-2324	-540	0	0	0	0	0	0	-114
044 Well3	1035159	-1029	-2462	-3333	-2324	-540	0	0	0	0	0	0	-114
044 Well4	1033160	-510	-1220	-1651	-1152	-267	0	0	0	0	0	0	-57
044 Well5	1032160	-510	-1220	-1651	-1152	-267	0	0	0	0	0	0	-57
044 Well6	1032159	-510	-1220	-1651	-1152	-267	0	0	0	0	0	0	-57
044 Well7	1031161	-123	-293	-397	-277	-64	0	0	0	0	0	0	-14
044 Well8	1032161	-123	-293	-397	-277	-64	0	0	0	0	0	0	-14
016 Well9	1051183	0	0	0	0	0	0	0	0	0	0	0	0

Point	Cell	S025 1982 May	S026 1982 Jun	S027 1982 Jul	S028 1982 Aug	S029 1982 Sep	S030 1982 Oct	S031 1982 Nov	S032 1982 Dec	S033 1983 Jan	S034 1983 Feb	S035 1983 Mar	S036 1983 Apr
044 Well1	1034159	-863	-1890	-2507	-2639	-916	0	0	0	0	0	0	-159
044 Well2	1035158	-863	-1890	-2507	-2639	-916	0	0	0	0	0	0	-159
044 Well3	1035159	-863	-1890	-2507	-2639	-916	0	0	0	0	0	0	-159
044 Well4	1033160	-427	-936	-1242	-1308	-454	0	0	0	0	0	0	-79
044 Well5	1032160	-427	-936	-1242	-1308	-454	0	0	0	0	0	0	-79
044 Well6	1032159	-427	-936	-1242	-1308	-454	0	0	0	0	0	0	-79
044 Well7	1031161	-103	-225	-299	-314	-109	0	0	0	0	0	0	-19
044 Well8	1032161	-103	-225	-299	-314	-109	0	0	0	0	0	0	-19
016 Well9	1051183	0	0	0	0	0	0	0	0	0	0	0	0

Point	Cell	S037	S038	S039	S040	S041	S042	S043	S044	S045	S046	S047	S048	
		1983	1983	1983	1983	1983	1983	1983	1983	1983	1984	1984	1984	1984
		May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	
044 Well1	1034159	-1107	-1650	-2504	-2042	-591	-129	0	0	0	0	0	-79	
044 Well2	1035158	-1107	-1650	-2504	-2042	-591	-129	0	0	0	0	0	-79	
044 Well3	1035159	-1107	-1650	-2504	-2042	-591	-129	0	0	0	0	0	-79	
044 Well4	1033160	-548	-818	-1241	-1012	-293	-64	0	0	0	0	0	-39	
044 Well5	1032160	-548	-818	-1241	-1012	-293	-64	0	0	0	0	0	-39	
044 Well6	1032159	-548	-818	-1241	-1012	-293	-64	0	0	0	0	0	-39	
044 Well7	1031161	-132	-197	-298	-243	-70	-15	0	0	0	0	0	-9	
044 Well8	1032161	-132	-197	-298	-243	-70	-15	0	0	0	0	0	-9	
016 Well9	1051183	0	0	0	0	0	0	0	0	0	0	0	0	

Point	Cell	S049	S050	S051	S052	S053	S054	S055	S056	S057	S058	S059	S060	
		1984	1984	1984	1984	1984	1984	1984	1984	1984	1985	1985	1985	1985
		May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	
044 Well1	1034159	-743	-1325	-2159	-2234	-851	-34	0	0	0	0	0	-101	
044 Well2	1035158	-743	-1325	-2159	-2234	-851	-34	0	0	0	0	0	-101	
044 Well3	1035159	-743	-1325	-2159	-2234	-851	-34	0	0	0	0	0	-101	
044 Well4	1033160	-368	-657	-1070	-1107	-421	-17	0	0	0	0	0	-50	
044 Well5	1032160	-368	-657	-1070	-1107	-421	-17	0	0	0	0	0	-50	
044 Well6	1032159	-368	-657	-1070	-1107	-421	-17	0	0	0	0	0	-50	
044 Well7	1031161	-88	-158	-257	-266	-101	-4	0	0	0	0	0	-12	
044 Well8	1032161	-88	-158	-257	-266	-101	-4	0	0	0	0	0	-12	
016 Well9	1051183	0	0	0	0	0	0	0	0	0	0	0	0	

Point	Cell	S061	S062	S063	S064	S065	S066	S067	S068	S069	S070	S071	S072	
		1985	1985	1985	1985	1985	1985	1985	1985	1985	1986	1986	1986	1986
		May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	
044 Well1	1034159	-961	-2578	-2770	-2231	-154	-23	0	0	0	0	0	-550	
044 Well2	1035158	-961	-2578	-2770	-2231	-154	-23	0	0	0	0	0	-550	
044 Well3	1035159	-961	-2578	-2770	-2231	-154	-23	0	0	0	0	0	-550	
044 Well4	1033160	-476	-1277	-1373	-1106	-76	-11	0	0	0	0	0	-273	
044 Well5	1032160	-476	-1277	-1373	-1106	-76	-11	0	0	0	0	0	-273	
044 Well6	1032159	-476	-1277	-1373	-1106	-76	-11	0	0	0	0	0	-273	
044 Well7	1031161	-114	-307	-330	-266	-18	-3	0	0	0	0	0	-66	
044 Well8	1032161	-114	-307	-330	-266	-18	-3	0	0	0	0	0	-66	
016 Well9	1051183	0	0	0	0	0	-738	0	0	0	0	0	0	

Point	Cell	S073	S074	S075	S076	S077	S078	S079	S080	S081	S082	S083	S084	
		1986	1986	1986	1986	1986	1986	1986	1986	1986	1987	1987	1987	1987
		May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	
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044 Well2	1035158	-1312	-2694	-2959	-2208	-590	0	0	0	0	0	0	-237	
044 Well3	1035159	-1312	-2694	-2959	-2208	-590	0	0	0	0	0	0	-237	
044 Well4	1033160	-650	-1335	-1466	-1094	-292	0	0	0	0	0	0	-118	
044 Well5	1032160	-650	-1335	-1466	-1094	-292	0	0	0	0	0	0	-118	
044 Well6	1032159	-650	-1335	-1466	-1094	-292	0	0	0	0	0	0	-118	
044 Well7	1031161	-156	-321	-352	-263	-70	0	0	0	0	0	0	-28	
044 Well8	1032161	-156	-321	-352	-263	-70	0	0	0	0	0	0	-28	
016 Well9	1051183	0	0	0	0	0	0	0	0	0	0	0	0	

Point	Cell	S085 1987 May	S086 1987 Jun	S087 1987 Jul	S088 1987 Aug	S089 1987 Sep	S090 1987 Oct	S091 1987 Nov	S092 1987 Dec	S093 1988 Jan	S094 1988 Feb	S095 1988 Mar	S096 1988 Apr
044 Well1	1034159	-1175	-2565	-2384	-2153	-824	-227	0	0	0	0	0	-189
044 Well2	1035158	-1175	-2565	-2384	-2153	-824	-227	0	0	0	0	0	-189
044 Well3	1035159	-1175	-2565	-2384	-2153	-824	-227	0	0	0	0	0	-189
044 Well4	1033160	-582	-1271	-1181	-1067	-408	-113	0	0	0	0	0	-94
044 Well5	1032160	-582	-1271	-1181	-1067	-408	-113	0	0	0	0	0	-94
044 Well6	1032159	-582	-1271	-1181	-1067	-408	-113	0	0	0	0	0	-94
044 Well7	1031161	-140	-306	-284	-256	-98	-27	0	0	0	0	0	-23
044 Well8	1032161	-140	-306	-284	-256	-98	-27	0	0	0	0	0	-23
016 Well9	1051183	0	0	0	0	0	0	0	0	0	0	0	0

Point	Cell	S097 1988 May	S098 1988 Jun	S099 1988 Jul	S100 1988 Aug	S101 1988 Sep	S102 1988 Oct	S103 1988 Nov	S104 1988 Dec	S105 1989 Jan	S106 1989 Feb	S107 1989 Mar	S108 1989 Apr
044 Well1	1034159	-1722	-3029	-3422	-1769	-650	-610	0	0	0	0	0	-283
044 Well2	1035158	-1722	-3029	-3422	-1769	-650	-610	0	0	0	0	0	-283
044 Well3	1035159	-1722	-3029	-3422	-1769	-650	-610	0	0	0	0	0	-283
044 Well4	1033160	-853	-1501	-1695	-876	-322	-302	0	0	0	0	0	-140
044 Well5	1032160	-853	-1501	-1695	-876	-322	-302	0	0	0	0	0	-140
044 Well6	1032159	-853	-1501	-1695	-876	-322	-302	0	0	0	0	0	-140
044 Well7	1031161	-205	-361	-408	-211	-77	-73	0	0	0	0	0	-34
044 Well8	1032161	-205	-361	-408	-211	-77	-73	0	0	0	0	0	-34
016 Well9	1051183	0	0	0	0	0	0	0	0	0	0	0	0

Point	Cell	S109 1989 May	S110 1989 Jun	S111 1989 Jul	S112 1989 Aug	S113 1989 Sep	S114 1989 Oct	S115 1989 Nov	S116 1989 Dec	S117 1990 Jan	S118 1990 Feb	S119 1990 Mar	S120 1990 Apr
044 Well1	1034159	-1464	-2409	-3383	-1771	-406	-189	0	0	0	0	0	-565
044 Well2	1035158	-1464	-2409	-3383	-1771	-406	-189	0	0	0	0	0	-565
044 Well3	1035159	-1464	-2409	-3383	-1771	-406	-189	0	0	0	0	0	-565
044 Well4	1033160	-725	-1193	-1676	-877	-201	-94	0	0	0	0	0	-280
044 Well5	1032160	-725	-1193	-1676	-877	-201	-94	0	0	0	0	0	-280
044 Well6	1032159	-725	-1193	-1676	-877	-201	-94	0	0	0	0	0	-280
044 Well7	1031161	-174	-287	-403	-211	-48	-23	0	0	0	0	0	-67
044 Well8	1032161	-174	-287	-403	-211	-48	-23	0	0	0	0	0	-67
016 Well9	1051183	0	0	0	0	0	0	0	0	0	0	0	0

Point	Cell	S121 1990 May	S122 1990 Jun	S123 1990 Jul	S124 1990 Aug	S125 1990 Sep	S126 1990 Oct	S127 1990 Nov	S128 1990 Dec	S129 1991 Jan	S130 1991 Feb	S131 1991 Mar	S132 1991 Apr
044 Well1	1034159	-1401	-2564	-3223	-1918	-940	-215	0	0	0	0	0	-199
044 Well2	1035158	-1401	-2564	-3223	-1918	-940	-215	0	0	0	0	0	-199
044 Well3	1035159	-1401	-2564	-3223	-1918	-940	-215	0	0	0	0	0	-199
044 Well4	1033160	-694	-1270	-1597	-951	-466	-107	0	0	0	0	0	-99
044 Well5	1032160	-694	-1270	-1597	-951	-466	-107	0	0	0	0	0	-99
044 Well6	1032159	-694	-1270	-1597	-951	-466	-107	0	0	0	0	0	-99
044 Well7	1031161	-167	-305	-384	-229	-112	-26	0	0	0	0	0	-24
044 Well8	1032161	-167	-305	-384	-229	-112	-26	0	0	0	0	0	-24
016 Well9	1051183	0	0	0	0	0	0	0	0	0	0	0	0

Point	Cell	S133 1991 May	S134 1991 Jun	S135 1991 Jul	S136 1991 Aug	S137 1991 Sep	S138 1991 Oct	S139 1991 Nov	S140 1991 Dec	S141 1992 Jan	S142 1992 Feb	S143 1992 Mar	S144 1992 Apr
044 Well1	1034159	-908	-2049	-3147	-2471	-602	0	0	0	0	0	0	-746
044 Well2	1035158	-908	-2049	-3147	-2471	-602	0	0	0	0	0	0	-746
044 Well3	1035159	-908	-2049	-3147	-2471	-602	0	0	0	0	0	0	-746
044 Well4	1033160	-450	-1015	-1559	-1224	-298	0	0	0	0	0	0	-369
044 Well5	1032160	-450	-1015	-1559	-1224	-298	0	0	0	0	0	0	-369
044 Well6	1032159	-450	-1015	-1559	-1224	-298	0	0	0	0	0	0	-369
044 Well7	1031161	-108	-244	-375	-294	-72	0	0	0	0	0	0	-89
044 Well8	1032161	-108	-244	-375	-294	-72	0	0	0	0	0	0	-89
016 Well9	1051183	0	0	0	0	0	0	0	0	0	0	0	0

Point	Cell	S145 1992 May	S146 1992 Jun	S147 1992 Jul	S148 1992 Aug	S149 1992 Sep	S150 1992 Oct	S151 1992 Nov	S152 1992 Dec	S153 1993 Jan	S154 1993 Feb	S155 1993 Mar	S156 1993 Apr
044 Well1	1034159	-2469	-2340	-3030	-1658	-27	0	0	0	0	0	0	-143
044 Well2	1035158	-2469	-2340	-3030	-1658	-27	0	0	0	0	0	0	-143
044 Well3	1035159	-2469	-2340	-3030	-1658	-27	0	0	0	0	0	0	-143
044 Well4	1033160	-1223	-1160	-1501	-821	-13	0	0	0	0	0	0	-71
044 Well5	1032160	-1223	-1160	-1501	-821	-13	0	0	0	0	0	0	-71
044 Well6	1032159	-1223	-1160	-1501	-821	-13	0	0	0	0	0	0	-71
044 Well7	1031161	-294	-279	-361	-197	-3	0	0	0	0	0	0	-17
044 Well8	1032161	-294	-279	-361	-197	-3	0	0	0	0	0	0	-17
016 Well9	1051183	0	0	0	0	0	-738	0	0	0	0	0	0

Point	Cell	S157 1993 May	S158 1993 Jun	S159 1993 Jul	S160 1993 Aug	S161 1993 Sep	S162 1993 Oct	S163 1993 Nov	S164 1993 Dec	S165 1994 Jan	S166 1994 Feb	S167 1994 Mar	S168 1994 Apr
044 Well1	1034159	-766	-1528	-2173	-2096	-938	-74	0	0	0	0	0	-198
044 Well2	1035158	-766	-1528	-2173	-2096	-938	-74	0	0	0	0	0	-198
044 Well3	1035159	-766	-1528	-2173	-2096	-938	-74	0	0	0	0	0	-198
044 Well4	1033160	-380	-757	-1077	-1039	-465	-37	0	0	0	0	0	-98
044 Well5	1032160	-380	-757	-1077	-1039	-465	-37	0	0	0	0	0	-98
044 Well6	1032159	-380	-757	-1077	-1039	-465	-37	0	0	0	0	0	-98
044 Well7	1031161	-91	-182	-259	-250	-112	-9	0	0	0	0	0	-24
044 Well8	1032161	-91	-182	-259	-250	-112	-9	0	0	0	0	0	-24
016 Well9	1051183	0	0	0	0	0	0	0	0	0	0	0	0

Point	Cell	S169 1994 May	S170 1994 Jun	S171 1994 Jul	S172 1994 Aug	S173 1994 Sep	S174 1994 Oct	S175 1994 Nov	S176 1994 Dec	S177 1995 Jan	S178 1995 Feb	S179 1995 Mar	S180 1995 Apr
044 Well1	1034159	-1659	-2775	-3333	-2004	-819	-162	0	0	0	0	0	-84
044 Well2	1035158	-1659	-2775	-3333	-2004	-819	-162	0	0	0	0	0	-84
044 Well3	1035159	-1659	-2775	-3333	-2004	-819	-162	0	0	0	0	0	-84
044 Well4	1033160	-822	-1375	-1651	-993	-406	-80	0	0	0	0	0	-41
044 Well5	1032160	-822	-1375	-1651	-993	-406	-80	0	0	0	0	0	-41
044 Well6	1032159	-822	-1375	-1651	-993	-406	-80	0	0	0	0	0	-41
044 Well7	1031161	-198	-331	-397	-239	-98	-19	0	0	0	0	0	-10
044 Well8	1032161	-198	-331	-397	-239	-98	-19	0	0	0	0	0	-10
016 Well9	1051183	0	0	0	0	0	0	0	0	0	0	0	0

Point	Cell	S181 1995 May	S182 1995 Jun	S183 1995 Jul	S184 1995 Aug	S185 1995 Sep	S186 1995 Oct	S187 1995 Nov	S188 1995 Dec	S189 1996 Jan	S190 1996 Feb	S191 1996 Mar	S192 1996 Apr
044 Well1	1034159	-779	-1164	-2487	-2403	-689	-156	0	0	0	0	0	-221
044 Well2	1035158	-779	-1164	-2487	-2403	-689	-156	0	0	0	0	0	-221
044 Well3	1035159	-779	-1164	-2487	-2403	-689	-156	0	0	0	0	0	-221
044 Well4	1033160	-386	-577	-1232	-1191	-342	-77	0	0	0	0	0	-110
044 Well5	1032160	-386	-577	-1232	-1191	-342	-77	0	0	0	0	0	-110
044 Well6	1032159	-386	-577	-1232	-1191	-342	-77	0	0	0	0	0	-110
044 Well7	1031161	-93	-139	-296	-286	-82	-19	0	0	0	0	0	-26
044 Well8	1032161	-93	-139	-296	-286	-82	-19	0	0	0	0	0	-26
016 Well9	1051183	0	0	0	0	0	0	0	0	0	0	0	0

Point	Cell	S193 1996 May	S194 1996 Jun	S195 1996 Jul	S196 1996 Aug	S197 1996 Sep	S198 1996 Oct	S199 1996 Nov	S200 1996 Dec	S201 1997 Jan	S202 1997 Feb	S203 1997 Mar	S204 1997 Apr
044 Well1	1034159	-900	-2624	-2872	-2278	-632	-244	0	0	0	0	0	0
044 Well2	1035158	-900	-2624	-2872	-2278	-632	-244	0	0	0	0	0	0
044 Well3	1035159	-900	-2624	-2872	-2278	-632	-244	0	0	0	0	0	0
044 Well4	1033160	-446	-1300	-1423	-1129	-313	-121	0	0	0	0	0	0
044 Well5	1032160	-446	-1300	-1423	-1129	-313	-121	0	0	0	0	0	0
044 Well6	1032159	-446	-1300	-1423	-1129	-313	-121	0	0	0	0	0	0
044 Well7	1031161	-107	-313	-342	-271	-75	-29	0	0	0	0	0	0
044 Well8	1032161	-107	-313	-342	-271	-75	-29	0	0	0	0	0	0
016 Well9	1051183	0	0	0	0	0	0	0	0	0	0	0	0

Point	Cell	S205 1997 May	S206 1997 Jun	S207 1997 Jul	S208 1997 Aug	S209 1997 Sep	S210 1997 Oct	S211 1997 Nov	S212 1997 Dec	S213 1998 Jan	S214 1998 Feb	S215 1998 Mar	S216 1998 Apr
044 Well1	1034159	-934	-1860	-2358	-1845	-735	-213	0	0	0	0	0	-35
044 Well2	1035158	-934	-1860	-2358	-1845	-735	-213	0	0	0	0	0	-35
044 Well3	1035159	-934	-1860	-2358	-1845	-735	-213	0	0	0	0	0	-35
044 Well4	1033160	-463	-922	-1169	-914	-364	-105	0	0	0	0	0	-17
044 Well5	1032160	-463	-922	-1169	-914	-364	-105	0	0	0	0	0	-17
044 Well6	1032159	-463	-922	-1169	-914	-364	-105	0	0	0	0	0	-17
044 Well7	1031161	-111	-222	-281	-220	-87	-25	0	0	0	0	0	-4
044 Well8	1032161	-111	-222	-281	-220	-87	-25	0	0	0	0	0	-4
016 Well9	1051183	0	0	0	0	0	0	0	0	0	0	0	0

Point	Cell	S217 1998 May	S218 1998 Jun	S219 1998 Jul	S220 1998 Aug	S221 1998 Sep	S222 1998 Oct	S223 1998 Nov	S224 1998 Dec	S225 1999 Jan	S226 1999 Feb	S227 1999 Mar	S228 1999 Apr
044 Well1	1034159	-643	-1271	-2679	-2349	-790	-259	0	0	0	0	0	0
044 Well2	1035158	-643	-1271	-2679	-2349	-790	-259	0	0	0	0	0	0
044 Well3	1035159	-643	-1271	-2679	-2349	-790	-259	0	0	0	0	0	0
044 Well4	1033160	-319	-630	-1327	-1164	-392	-128	0	0	0	0	0	0
044 Well5	1032160	-319	-630	-1327	-1164	-392	-128	0	0	0	0	0	0
044 Well6	1032159	-319	-630	-1327	-1164	-392	-128	0	0	0	0	0	0
044 Well7	1031161	-77	-151	-319	-280	-94	-31	0	0	0	0	0	0
044 Well8	1032161	-77	-151	-319	-280	-94	-31	0	0	0	0	0	0
016 Well9	1051183	0	0	0	0	0	0	0	0	0	0	0	0

Point	Cell	S229 1999 May	S230 1999 Jun	S231 1999 Jul	S232 1999 Aug	S233 1999 Sep	S234 1999 Oct	S235 1999 Nov	S236 1999 Dec	S237 2000 Jan	S238 2000 Feb	S239 2000 Mar	S240 2000 Apr
044 Well1	1034159	-628	-1812	-2751	-2134	-869	0	0	0	0	0	0	-141
044 Well2	1035158	-628	-1812	-2751	-2134	-869	0	0	0	0	0	0	-141
044 Well3	1035159	-628	-1812	-2751	-2134	-869	0	0	0	0	0	0	-141
044 Well4	1033160	-311	-898	-1363	-1057	-431	0	0	0	0	0	0	-70
044 Well5	1032160	-311	-898	-1363	-1057	-431	0	0	0	0	0	0	-70
044 Well6	1032159	-311	-898	-1363	-1057	-431	0	0	0	0	0	0	-70
044 Well7	1031161	-75	-216	-328	-254	-104	0	0	0	0	0	0	-17
044 Well8	1032161	-75	-216	-328	-254	-104	0	0	0	0	0	0	-17
016 Well9	1051183	0	0	0	0	0	0	0	0	0	0	0	0

Point	Cell	S241 2000 May	S242 2000 Jun	S243 2000 Jul	S244 2000 Aug	S245 2000 Sep	S246 2000 Oct	S247 2000 Nov	S248 2000 Dec	S249 2001 Jan	S250 2001 Feb	S251 2001 Mar	S252 2001 Apr
044 Well1	1034159	-1458	-2519	-2963	-2034	-427	0	0	0	0	0	0	-10
044 Well2	1035158	-1458	-2519	-2963	-2034	-427	0	0	0	0	0	0	-10
044 Well3	1035159	-1458	-2519	-2963	-2034	-427	0	0	0	0	0	0	-10
044 Well4	1033160	-722	-1248	-1468	-1008	-212	0	0	0	0	0	0	-5
044 Well5	1032160	-722	-1248	-1468	-1008	-212	0	0	0	0	0	0	-5
044 Well6	1032159	-722	-1248	-1468	-1008	-212	0	0	0	0	0	0	-5
044 Well7	1031161	-174	-300	-353	-242	-51	0	0	0	0	0	0	-1
044 Well8	1032161	-174	-300	-353	-242	-51	0	0	0	0	0	0	-1
016 Well9	1051183	0	0	0	0	0	0	0	0	0	0	0	0

Point	Cell	S253 2001 May	S254 2001 Jun	S255 2001 Jul	S256 2001 Aug	S257 2001 Sep	S258 2001 Oct	S259 2001 Nov	S260 2001 Dec	S261 2002 Jan	S262 2002 Feb	S263 2002 Mar	S264 2002 Apr
044 Well1	1034159	-1810	-2384	-2794	-2042	-736	-43	0	0	0	0	0	-81
044 Well2	1035158	-1810	-2384	-2794	-2042	-736	-43	0	0	0	0	0	-81
044 Well3	1035159	-1810	-2384	-2794	-2042	-736	-43	0	0	0	0	0	-81
044 Well4	1033160	-897	-1181	-1385	-1012	-365	-21	0	0	0	0	0	-40
044 Well5	1032160	-897	-1181	-1385	-1012	-365	-21	0	0	0	0	0	-40
044 Well6	1032159	-897	-1181	-1385	-1012	-365	-21	0	0	0	0	0	-40
044 Well7	1031161	-216	-284	-333	-243	-88	-5	0	0	0	0	0	-10
044 Well8	1032161	-216	-284	-333	-243	-88	-5	0	0	0	0	0	-10
016 Well9	1051183	0	0	0	-738	-714	-738	0	0	0	0	0	0

Point	Cell	S265 2002 May	S266 2002 Jun	S267 2002 Jul	S268 2002 Aug	S269 2002 Sep	S270 2002 Oct	S271 2002 Nov	S272 2002 Dec	S273 2003 Jan	S274 2003 Feb	S275 2003 Mar	S276 2003 Apr
044 Well1	1034159	-1267	-2183	-2937	-2031	-806	-235	0	0	0	0	0	-40
044 Well2	1035158	-1267	-2183	-2937	-2031	-806	-235	0	0	0	0	0	-40
044 Well3	1035159	-1267	-2183	-2937	-2031	-806	-235	0	0	0	0	0	-40
044 Well4	1033160	-628	-1082	-1455	-1006	-399	-117	0	0	0	0	0	-20
044 Well5	1032160	-628	-1082	-1455	-1006	-399	-117	0	0	0	0	0	-20
044 Well6	1032159	-628	-1082	-1455	-1006	-399	-117	0	0	0	0	0	-20
044 Well7	1031161	-151	-260	-350	-242	-96	-28	0	0	0	0	0	-5
044 Well8	1032161	-151	-260	-350	-242	-96	-28	0	0	0	0	0	-5
016 Well9	1051183	0	0	0	-738	-714	-738	0	0	0	0	0	0

Point	Cell	S277	S278	S279	S280	S281	S282	S283	S284	S285	S286	S287	S288	
		2003	2003	2003	2003	2003	2003	2003	2003	2003	2004	2004	2004	2004
		May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	
044 Well1	1034159	-1565	-2584	-3431	-1693	-373	-5	0	0	0	0	0	-446	
044 Well2	1035158	-1565	-2584	-3431	-1693	-373	-5	0	0	0	0	0	-446	
044 Well3	1035159	-1565	-2584	-3431	-1693	-373	-5	0	0	0	0	0	-446	
044 Well4	1033160	-775	-1280	-1700	-839	-185	-3	0	0	0	0	0	-221	
044 Well5	1032160	-775	-1280	-1700	-839	-185	-3	0	0	0	0	0	-221	
044 Well6	1032159	-775	-1280	-1700	-839	-185	-3	0	0	0	0	0	-221	
044 Well7	1031161	-186	-308	-409	-202	-44	-1	0	0	0	0	0	-53	
044 Well8	1032161	-186	-308	-409	-202	-44	-1	0	0	0	0	0	-53	
016 Well9	1051183	0	0	0	0	-714	-738	0	0	0	0	0	0	

Point	Cell	S289	S290	S291	S292	S293	S294	S295	S296	S297	S298	S299	S300	
		2004	2004	2004	2004	2004	2004	2004	2004	2004	2005	2005	2005	2005
		May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	
044 Well1	1034159	-1300	-2081	-2734	-1622	-414	-27	0	0	0	0	0	-124	
044 Well2	1035158	-1300	-2081	-2734	-1622	-414	-27	0	0	0	0	0	-124	
044 Well3	1035159	-1300	-2081	-2734	-1622	-414	-27	0	0	0	0	0	-124	
044 Well4	1033160	-644	-1031	-1355	-804	-205	-14	0	0	0	0	0	-61	
044 Well5	1032160	-644	-1031	-1355	-804	-205	-14	0	0	0	0	0	-61	
044 Well6	1032159	-644	-1031	-1355	-804	-205	-14	0	0	0	0	0	-61	
044 Well7	1031161	-155	-248	-326	-193	-49	-3	0	0	0	0	0	-15	
044 Well8	1032161	-155	-248	-326	-193	-49	-3	0	0	0	0	0	-15	
016 Well9	1051183	0	0	0	0	0	0	0	0	0	0	0	0	

Point	Cell	S301	S302	S303	S304	S305	S306	S307	S308	S309	S310	S311	S312	
		2005	2005	2005	2005	2005	2005	2005	2005	2005	2006	2006	2006	2006
		May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	
044 Well1	1034159	-834	-1773	-3259	-1961	-512	-194	0	0	0	0	0	-49	
044 Well2	1035158	-834	-1773	-3259	-1961	-512	-194	0	0	0	0	0	-49	
044 Well3	1035159	-834	-1773	-3259	-1961	-512	-194	0	0	0	0	0	-49	
044 Well4	1033160	-413	-878	-1615	-972	-254	-96	0	0	0	0	0	-24	
044 Well5	1032160	-413	-878	-1615	-972	-254	-96	0	0	0	0	0	-24	
044 Well6	1032159	-413	-878	-1615	-972	-254	-96	0	0	0	0	0	-24	
044 Well7	1031161	-99	-211	-388	-234	-61	-23	0	0	0	0	0	-6	
044 Well8	1032161	-99	-211	-388	-234	-61	-23	0	0	0	0	0	-6	
016 Well9	1051183	0	0	0	0	0	0	0	0	0	0	0	0	

Point	Cell	S313	S314	S315	S316	S317	S318	S319	S320	S321	S322	S323	S324	
		2006	2006	2006	2006	2006	2006	2006	2006	2006	2007	2007	2007	2007
		May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	
044 Well1	1034159	-1306	-2272	-3159	-1783	-437	-90	0	0	0	0	0	-585	
044 Well2	1035158	-1306	-2272	-3159	-1783	-437	-90	0	0	0	0	0	-585	
044 Well3	1035159	-1306	-2272	-3159	-1783	-437	-90	0	0	0	0	0	-585	
044 Well4	1033160	-647	-1126	-1565	-883	-217	-45	0	0	0	0	0	-290	
044 Well5	1032160	-647	-1126	-1565	-883	-217	-45	0	0	0	0	0	-290	
044 Well6	1032159	-647	-1126	-1565	-883	-217	-45	0	0	0	0	0	-290	
044 Well7	1031161	-156	-271	-376	-212	-52	-11	0	0	0	0	0	-70	
044 Well8	1032161	-156	-271	-376	-212	-52	-11	0	0	0	0	0	-70	
016 Well9	1051183	0	0	0	0	0	0	0	0	0	0	0	0	

Point	Cell	S325 2007 May	S326 2007 Jun	S327 2007 Jul	S328 2007 Aug	S329 2007 Sep	S330 2007 Oct	S331 2007 Nov	S332 2007 Dec	S333 2008 Jan	S334 2008 Feb	S335 2008 Mar	S336 2008 Apr
044 Well1	1034159	-2000	-2687	-3272	-1238	-432	-17	0	0	0	0	0	-83
044 Well2	1035158	-2000	-2687	-3272	-1238	-432	-17	0	0	0	0	0	-83
044 Well3	1035159	-2000	-2687	-3272	-1238	-432	-17	0	0	0	0	0	-83
044 Well4	1033160	-991	-1332	-1621	-613	-214	-9	0	0	0	0	0	-41
044 Well5	1032160	-991	-1332	-1621	-613	-214	-9	0	0	0	0	0	-41
044 Well6	1032159	-991	-1332	-1621	-613	-214	-9	0	0	0	0	0	-41
044 Well7	1031161	-238	-320	-390	-147	-52	-2	0	0	0	0	0	-10
044 Well8	1032161	-238	-320	-390	-147	-52	-2	0	0	0	0	0	-10
016 Well9	1051183	0	0	0	0	0	0	0	0	0	0	0	0

Point	Cell	S337 2008 May	S338 2008 Jun	S339 2008 Jul	S340 2008 Aug	S341 2008 Sep	S342 2008 Oct
044 Well1	1034159	-601	-2779	-3122	-2434	-872	-71
044 Well2	1035158	-601	-2779	-3122	-2434	-872	-71
044 Well3	1035159	-601	-2779	-3122	-2434	-872	-71
044 Well4	1033160	-298	-1377	-1547	-1206	-432	-35
044 Well5	1032160	-298	-1377	-1547	-1206	-432	-35
044 Well6	1032159	-298	-1377	-1547	-1206	-432	-35
044 Well7	1031161	-72	-331	-372	-290	-104	-8
044 Well8	1032161	-72	-331	-372	-290	-104	-8
016 Well9	1051183	-738	0	0	0	0	0

APPENDIX B: Fixed-point stress data.

1. Values have been summed by point type, to reduce table size (there are over 1,000 fixed points).
2. Values are in acre feet per stress period.
3. Negative numbers indicate extraction from the aquifer.
4. Flag "E" indicates Henrys Fork/Teton exchange wells. Flag "M" indicates Mud Lake exchange wells. Flag "UR"³ indicates urban or industrial areas. Flag "W" indicates wetland points.

Flag	S001	S002	S003	S004	S005	S006	S007	S008	S009	S010	S011	S012
	1980	1980	1980	1980	1980	1980	1980	1980	1981	1981	1981	1981
	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Mar	Apr	May
E	-23029	-26389	-28237	-25270	-16768	0	0	0	0	0	0	-4374
M	-5063	-5802	-6208	-5556	-3687	0	0	0	0	0	0	-962
UR	-28843	-30389	-24457	-23255	-25256	5792	1909	1909	1909	1909	18987	12020
W	-21839	-43924	-56156	-45587	-25929	-12614	-2738	-2370	-1772	-3252	-6355	-7783

Flag	S013	S014	S015	S016	S017	S018	S019	S020	S021	S022	S023	S024
	1981	1981	1981	1981	1981	1981	1981	1982	1982	1982	1982	1982
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Mar	Apr	May	Jun
E	-19190	-23756	-27082	-25225	-20384	0	0	0	0	0	0	-6610
M	-4219	-5223	-5954	-5546	-4482	0	0	0	0	0	0	-1453
UR	-21696	-25277	-20272	-23203	-30958	6796	1909	1909	1909	1909	10895	-608
W	-14002	-23403	-54683	-55790	-27445	-5230	-2587	-2379	-2011	-2959	-6440	-7168

³ Note that early versions of MKMOD could not accommodate the "UR" flag, so some preliminary data sets had urban/industrial points coded as "E."

Flag	S025	S026	S027	S028	S029	S030	S031	S032	S033	S034	S035	S036
	1982	1982	1982	1982	1982	1982	1983	1983	1983	1983	1983	1983
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Mar	Apr	May	Jun	Jul
E	-25778	-27931	-26187	-24540	-18384	0	0	0	0	0	0	-8857
M	-5668	-6141	-5757	-5395	-4042	0	0	0	0	0	0	-1947
UR	-37805	-37760	-29219	-28050	-29678	5304	1909	1909	1909	1909	1909	-14155
W	-8093	-16924	-43197	-52789	-26422	-7127	-3509	-1956	-2193	-3509	-6759	-6144
Flag	S037	S038	S039	S040	S041	S042	S043	S044	S045	S046	S047	S048
	1983	1983	1983	1983	1983	1984	1984	1984	1984	1984	1984	1984
	Aug	Sep	Oct	Nov	Dec	Jan	Mar	Apr	May	Jun	Jul	Aug
E	-24538	-29894	-26581	-24202	-19326	0	0	0	0	0	0	-12955
M	-5395	-6572	-5844	-5321	-4249	0	0	0	0	0	0	-2848
UR	-41392	-49051	-39743	-36279	-33635	4424	1909	1909	1909	1909	1909	-22471
W	-8539	-22091	-50800	-49184	-23090	-6456	-2880	-1596	-1795	-2454	-3738	-8035
Flag	S049	S050	S051	S052	S053	S054	S055	S056	S057	S058	S059	S060
	1984	1984	1984	1984	1985	1985	1985	1985	1985	1985	1985	1985
	Sep	Oct	Nov	Dec	Jan	Mar	Apr	May	Jun	Jul	Aug	Sep
E	-24720	-25318	-26815	-23658	-19224	0	0	0	0	0	0	-4612
M	-5435	-5566	-5896	-5201	-4227	0	0	0	0	0	0	-1014
UR	-43192	-41561	-42653	-37135	-33899	4218	1909	1909	1909	1909	1909	-5540
W	-7072	-29107	-49026	-47596	-21893	-4241	-2178	-1739	-1679	-2433	-4296	-5367

Flag	S061	S062	S063	S064	S065	S066	S067	S068	S069	S070	S071	S072
	1985	1985	1985	1986	1986	1986	1986	1986	1986	1986	1986	1986
	Oct	Nov	Dec	Jan	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
E	-21774	-24271	-26487	-24398	-12283	0	0	0	0	0	0	-15120
M	-4787	-5336	-5823	-5364	-2700	0	0	0	0	0	0	-3324
UR	-27703	-28017	-21415	-25968	-16686	5589	1909	1909	1909	1909	1909	-26864
W	-12248	-36431	-57599	-41436	-17459	-4047	-1806	-1862	-2616	-3678	-5944	-9846
Flag	S073	S074	S075	S076	S077	S078	S079	S080	S081	S082	S083	S084
	1986	1986	1987	1987	1987	1987	1987	1987	1987	1987	1987	1987
	Nov	Dec	Jan	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
E	-27431	-29049	-27514	-24569	-16970	0	0	0	0	0	0	-9604
M	-6031	-6387	-6049	-5402	-3731	0	0	0	0	0	0	-2111
UR	-40656	-39481	-30283	-27917	-26682	5376	2734	1909	1909	1909	1909	-15670
W	-9120	-27835	-49614	-53184	-23326	-4893	-2593	-1271	-2314	-2834	-5416	-5353
Flag	S085	S086	S087	S088	S089	S090	S091	S092	S093	S094	S095	S096
	1987	1988	1988	1988	1988	1988	1988	1988	1988	1988	1988	1988
	Dec	Jan	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
E	-21826	-22737	-25177	-23040	-12900	0	0	0	0	0	0	-3714
M	-4799	-4999	-5535	-5066	-2836	0	0	0	0	0	0	-816
UR	-20008	-15224	-10280	-12535	-15362	6713	1909	1909	1909	1909	1909	-3717
W	-19477	-48049	-52343	-44672	-19786	-5064	-2747	-2070	-2077	-2660	-3788	-7134

Flag	S097	S098	S099	S100	S101	S102	S103	S104	S105	S106	S107	S108
	1989	1989	1989	1989	1989	1989	1989	1989	1989	1989	1989	1990
	Jan	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
E	-20387	-21997	-17270	-14763	-9924	0	0	0	0	0	0	-247
M	-4482	-4836	-3797	-3246	-2182	0	0	0	0	0	0	-54
UR	-7279	-2121	29857	24539	-103	10380	1909	1909	1909	1909	12826	14234
W	-7773	-37375	-59822	-49418	-22248	-5932	-2271	-2097	-2320	-2321	-6916	-5570
Flag	S109	S110	S111	S112	S113	S114	S115	S116	S117	S118	S119	S120
	1990	1990	1990	1990	1990	1990	1990	1990	1990	1990	1991	1991
	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Mar
E	-20245	-24724	-28152	-26113	-15903	0	0	0	0	0	0	-5443
M	-4451	-5436	-6189	-5741	-3496	0	0	0	0	0	0	-1197
UR	-10972	-12395	-4294	-7249	-19310	7553	1909	1909	1909	1909	23132	13996
W	-11788	-35921	-58071	-45483	-11856	-5607	-2573	-1617	-2317	-2072	-5549	-7131
Flag	S121	S122	S123	S124	S125	S126	S127	S128	S129	S130	S131	S132
	1991	1991	1991	1991	1991	1991	1991	1991	1991	1992	1992	1992
	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Mar	Apr
E	-19647	-17552	-21521	-15931	-11675	0	0	0	0	0	0	-1205
M	-4319	-3859	-4731	-3503	-2567	0	0	0	0	0	0	-265
UR	-7202	5394	11392	13537	-9771	7922	1909	1909	1909	1909	32171	35181
W	-9479	-24767	-51086	-52965	-42491	-7334	-2933	-1538	-2085	-2814	-5789	-7591

Flag	S133	S134	S135	S136	S137	S138	S139	S140	S141	S142	S143	S144
	1992	1992	1992	1992	1992	1992	1992	1992	1993	1993	1993	1993
	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Mar	Apr	May
E	-12649	-25729	-20450	-17089	-10947	0	0	0	0	0	0	-5183
M	-2781	-5657	-4496	-3757	-2407	0	0	0	0	0	0	-1140
UR	12857	-7298	11806	7564	-9442	7552	1909	1909	1909	1909	22319	17606
W	-11058	-23539	-55303	-53410	-31630	-7290	-3278	-1936	-1406	-3069	-4750	-5162
Flag	S145	S146	S147	S148	S149	S150	S151	S152	S153	S154	S155	S156
	1993	1993	1993	1993	1993	1993	1993	1994	1994	1994	1994	1994
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Mar	Apr	May	Jun
E	-18727	-13518	-13410	-12859	-2670	0	0	0	0	0	0	-1509
M	-4117	-2972	-2948	-2827	-587	0	0	0	0	0	0	-332
UR	4719	27289	37674	28646	13622	13033	1909	1909	1909	1909	20445	19293
W	-17781	-45837	-55329	-44558	-7793	-6527	-2673	-2028	-2177	-2405	-5728	-8466
Flag	S157	S158	S159	S160	S161	S162	S163	S164	S165	S166	S167	S168
	1994	1994	1994	1994	1994	1994	1995	1995	1995	1995	1995	1995
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Mar	Apr	May	Jun	Jul
E	-20491	-27553	-29100	-25742	-21287	0	0	0	0	0	0	-6525
M	-4505	-6058	-6398	-5660	-4680	0	0	0	0	0	0	-1435
UR	-23522	-32785	-29196	-26363	-34438	5816	1909	1909	1909	1909	26945	15613
W	-11770	-33261	-47959	-42224	-16597	-6355	-1403	-1526	-1633	-2903	-4081	-5832

Flag	S169	S170	S171	S172	S173	S174	S175	S176	S177	S178	S179	S180
	1995	1995	1995	1995	1995	1996	1996	1996	1996	1996	1996	1996
	Aug	Sep	Oct	Nov	Dec	Jan	Mar	Apr	May	Jun	Jul	Aug
E	-20474	-24707	-19321	-15160	-12222	0	0	0	0	0	0	-8489
M	-4501	-5432	-4248	-3333	-2687	0	0	0	0	0	0	-1866
UR	-9457	-8884	21116	17491	-6784	12530	1909	1909	1909	1909	1909	-13407
W	-15776	-46539	-59819	-55212	-32153	-14180	-2318	-1762	-2502	-3147	-8081	-5782
Flag	S181	S182	S183	S184	S185	S186	S187	S188	S189	S190	S191	S192
	1996	1996	1996	1996	1997	1997	1997	1997	1997	1997	1997	1997
	Sep	Oct	Nov	Dec	Jan	Mar	Apr	May	Jun	Jul	Aug	Sep
E	-25461	-32018	-32473	-27066	-23019	0	0	0	0	0	0	-11901
M	-5598	-7039	-7139	-5951	-5061	0	0	0	0	0	0	-2617
UR	-41338	-51074	-48614	-39998	-40437	4707	1909	1909	1909	1909	18620	-3620
W	-11453	-25689	-45978	-47496	-22051	-4483	-2262	-2728	-2510	-3263	-5734	-6511
Flag	S193	S194	S195	S196	S197	S198	S199	S200	S201	S202	S203	S204
	1997	1997	1997	1998	1998	1998	1998	1998	1998	1998	1998	1998
	Oct	Nov	Dec	Jan	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
E	-24288	-28886	-28814	-25992	-21234	0	0	0	0	0	0	-16146
M	-5340	-6351	-6335	-5714	-4668	0	0	0	0	0	0	-3550
UR	-18505	-20204	-8132	-10137	-30073	7650	1909	1909	1909	1909	1909	-28945
W	-9892	-20784	-51194	-52305	-19414	-3849	-2574	-2049	-2203	-2493	-4336	-5811

Flag	S205	S206	S207	S208	S209	S210	S211	S212	S213	S214	S215	S216
	1998	1998	1999	1999	1999	1999	1999	1999	1999	1999	1999	1999
	Nov	Dec	Jan	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
E	-31616	-30020	-26725	-24123	-20965	0	0	0	0	0	0	-11636
M	-6951	-6600	-5876	-5304	-4609	0	0	0	0	0	0	-2558
UR	-44438	-35797	-21856	-21355	-33217	6055	1909	1909	1909	1909	9383	-12320
W	-9209	-27253	-52027	-50767	-30606	-7244	-2118	-2050	-2395	-3050	-5054	-5966
Flag	S217	S218	S219	S220	S221	S222	S223	S224	S225	S226	S227	S228
	1999	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
	Dec	Jan	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
E	-26052	-27952	-29342	-26106	-19915	0	0	0	0	0	0	-10539
M	-5728	-6145	-6451	-5740	-4378	0	0	0	0	0	0	-2317
UR	-39366	-39067	-37201	-33857	-33083	5159	1909	1909	1909	1909	1909	-17568
W	-10927	-18597	-44355	-52240	-36913	-6032	-3240	-1714	-1848	-3157	-4358	-6740
Flag	S229	S230	S231	S232	S233	S234	S235	S236	S237	S238	S239	S240
	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2001	2002
	Jan	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
E	-25953	-29398	-28551	-26478	-21502	0	0	0	0	0	0	-7605
M	-5706	-6463	-6277	-5821	-4727	0	0	0	0	0	0	-1672
UR	-37411	-39894	-32697	-32207	-35784	5415	1909	1909	1909	1909	1909	-11614
W	-10941	-19193	-48319	-50305	-27506	-4437	-2018	-1075	-1703	-3886	-5837	-5955

Flag	S241	S242	S243	S244	S245	S246	S247	S248	S249	S250	S251	S252
	2002	2002	2002	2002	2002	2002	2002	2002	2002	2002	2003	2003
	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Mar
E	-20200	-24887	-28085	-25416	-18415	0	0	0	0	0	0	-4613
M	-4441	-5472	-6175	-5588	-4049	0	0	0	0	0	0	-1014
UR	-7169	-8336	4385	-4446	-23374	8088	1909	1909	1909	1909	12786	5856
W	-8551	-30958	-52663	-51775	-24268	-5559	-2256	-1465	-1910	-2414	-4367	-5333
Flag	S253	S254	S255	S256	S257	S258	S259	S260	S261	S262	S263	S264
	2003	2003	2003	2003	2003	2003	2003	2003	2003	2004	2004	2004
	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Mar	Apr
E	-20312	-23138	-13764	-13698	-10119	0	0	0	0	0	0	0
M	-4466	-5087	-3026	-3012	-2225	0	0	0	0	0	0	0
UR	-6169	-3575	11246	6468	-3724	11780	7983	8732	10061	9149	21441	26740
W	-8792	-36985	-55919	-56293	-31060	-6375	-2209	-1690	-1928	-1889	-4360	-6660
Flag	S265	S266	S267	S268	S269	S270	S271	S272	S273	S274	S275	S276
	2004	2004	2004	2004	2004	2004	2004	2004	2005	2005	2005	2005
	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Mar	Apr	May
E	-20002	-24001	-20971	-14162	-12286	0	0	0	0	0	0	-2180
M	-4398	-5277	-4611	-3114	-2701	0	0	0	0	0	0	-479
UR	16471	32923	16314	15181	-1121	17386	9796	8838	9157	8312	23965	29076
W	-7464	-29319	-55727	-49772	-28314	-3439	-2447	-1346	-2005	-2853	-4612	-7774

Flag	S277	S278	S279	S280	S281	S282	S283	S284	S285	S286	S287	S288
	2005	2005	2005	2005	2005	2005	2005	2006	2006	2006	2006	2006
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Mar	Apr	May	Jun
E	-16960	-25361	-26527	-16862	-10501	-262	0	0	0	0	0	-4483
M	-3729	-5576	-5832	-3707	-2309	-58	0	0	0	0	0	-986
UR	22148	31414	7682	18435	5534	23284	1979	1909	1909	1909	16470	11807
W	-7294	-26079	-61872	-54301	-17325	-3184	-1935	-2370	-1784	-2282	-5167	-5960
Flag	S289	S290	S291	S292	S293	S294	S295	S296	S297	S298	S299	S300
	2006	2006	2006	2006	2006	2006	2007	2007	2007	2007	2007	2007
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Mar	Apr	May	Jun	Jul
E	-17398	-19463	-13895	-11614	-2817	-246	0	0	0	0	0	0
M	-3825	-4279	-3055	-2553	-619	-54	0	0	0	0	0	0
UR	-6186	-4300	8085	317	10760	9459	1909	1909	1909	1909	13634	20144
W	-7618	-21237	-50296	-46940	-10277	-8063	-2669	-1174	-1866	-2524	-5053	-8204
Flag	S301	S302	S303	S304	S305	S306	S307	S308	S309	S310	S311	S312
	2007	2007	2007	2007	2007	2008	2008	2008	2008	2008	2008	2008
	Aug	Sep	Oct	Nov	Dec	Jan	Mar	Apr	May	Jun	Jul	Aug
E	-10751	-21991	-26699	-26645	-15046	0	0	0	0	0	0	-12546
M	-2364	-4835	-5870	-5858	-3308	0	0	0	0	0	0	-2758
UR	-7457	-29400	-22385	-28711	-24276	6348	1909	1909	1909	1909	5704	-17845
W	-12593	-24680	-52462	-50686	-28136	-6814	-2424	-1798	-2484	-2356	-6559	-10182

Flag	S313	S314	S315	S316	S317	S318	S319	S320	S321	S322	S323	S324
	2008	2008	2008	2008	2009	2009	2009	2009	2009	2009	2009	2009
	Sep	Oct	Nov	Dec	Jan	Mar	Apr	May	Jun	Jul	Aug	Sep
E	-29394	-26262	-27327	-24679	-17979	0	0	0	0	0	0	-2733
M	-6462	-5774	-6008	-5426	-3953	0	0	0	0	0	0	-601
UR	-55446	-39361	-26551	-22642	-26114	3876	1909	1909	1909	1909	14425	10788
W	-9438	-38895	-60834	-51730	-17145	-7159	-2427	-1805	-2007	-2757	-4867	-7592
Flag	S325	S326	S327	S328	S329	S330	S331	S332	S333	S334	S335	S336
	2009	2009	2009	2010	2010	2010	2010	2010	2010	2010	2010	2010
	Oct	Nov	Dec	Jan	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
E	-20169	-24788	-27683	-19955	-12563	0	0	0	0	0	0	0
M	-4434	-5450	-6086	-4387	-2762	0	0	0	0	0	0	0
UR	-14591	-8552	-11110	-13621	-6969	11492	1909	1909	1909	1909	11285	13195
W	-10115	-42389	-61258	-51094	-30889	-10749	-2376	-1178	-1893	-2451	-4073	-4556
Flag	S337	S338	S339	S340	S341	S342						
	2010	2010	2011	2011	2011	2011						
	Nov	Dec	Jan	Mar	Apr	May						
E	-12378	-18148	-25417	-25205	-11918	0						
M	-2721	-3990	-5588	-5541	-2620	0						
UR	-2930	3195	-720	-11409	-5324	13036						
W	-8221	-25254	-51458	-52480	-29959	-9853						