2009
SUMMARY REPORT
for the
SALINITY ASSESSMENT OF SELECTED FIELDS
on the
COLORADO RIVER INDIAN RESERVATION

By

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1.0 Introduction

Soil and Water West, Inc. (SWWI) was retained by the Colorado River Indian Tribes (CRIT) to conduct soil salinity assessments on 18 irrigated fields on the Colorado River Indian Reservation. The planning for this work began in 2008. The actual field work was conducted in January 2009.

This work is, in general, a continuation of work that SWWI conducted in 2006 (see SWWI report dated February 22, 2007) where salinity assessments were conducted on 8 fields. The focus of the work done in 2006 was to evaluate leaching benefits, and both pre-leaching and post-leaching assessments were conducted on the eight fields. The work conducted under the present project and that is the subject of this report is broader in nature and includes a total of 18 fields, but was not done specifically to evaluate the benefits of leaching.

Irrigated agriculture presently accounts for about one third of the world's production of food and fiber. It is anticipated that it will need to produce nearly 50 percent by the year 2040 (FAO, 1988). This will likely be difficult, because extensive areas of irrigated land have been and are increasingly becoming degraded by salinization and water-logging. Increased irrigation efficiency is being sought to conserve water and to reduce drainage, water-logging and secondary salinization.[1]

The technology employed in this project was developed by the United States Salinity Laboratory of USDA Agricultural Research Service, located in Riverside, CA. The salinity assessment provides detailed soil salinity measurements across a field, both spatially and to a depth of four feet in one foot increments. Other soil parameters are measured also. These include soil pH, sodium adsorption ratio, and saturation percent (related to soil texture). These data are used to (1) identify fields or parts of fields that are adversely affected by soil salinity; (2) quantify the actual impacts of elevated soil salinity on yields of specific crops; (3) ascertain the causes of field salinization, and therefore provide a basis for the remediation of the saline areas; and (4) provide insight into the adequacy of irrigation management, including uniformity of irrigation water distribution, quantity of water applied, seepage from irrigation canals and ditches affecting field conditions, etc.

This report presents a summary of the data collected on the 18 fields that constitute this study. Some of these fields are adversely affected by salinity and some are not. Table 3.1 presents the results of the analyses for each field. Although it is not a part of this study, SWWI is willing to

[1] Rhoades, J.D, Chanduvi, F., and Lesch, S. Soil Salinity Assessment, Methods and Interpretation; FAO Irrigation and Drainage Paper 57; pg. 1.

assist those operators who are interested in developing site-specific remediation for their specific fields, crops, and management situations.

2.0 Methodology

Soil and Water West, Inc. was provided the list of fields to evaluate by CRIT. SWWI digitized the fields and prepared base maps for use in the field. This was completed in November 2008.

There was a period of time in early January 2009 when the irrigation canals were drained for maintenance and we could enter all of the fields as needed to conduct the study. Field work was performed from January 5 through January 17. Eighteen fields were selected. These were identified as:

CR0801	CR0802	CR0803a	CR0803b	CR0804a	CR0804b
CR0805	CR0806	CR0807	CR0809	CR0814	CR0815
CR0816	CR0817	CR0818a	CR0818b	CR0819a	CR0819b

Maps depicting the location of these fields are presented in Figures 1 through 4.

At each field, the survey equipment was assembled on the field vehicle so that the GPS antenna was located directly above the EM-38. The EM-38 was then towed across the field in transects. Transects were, wherever possible, oriented so that the direction of transect corresponded to the direction of flow of irrigation water through the field. In other words, if the direction of flow of the irrigation water was from west to east, field transects were oriented east and west. The EM-38 unit was connected to the GPS datalogger. The GPS datalogger was programmed to download the geographic coordinates concurrently with the EM-38 readings every 5 seconds as the unit was towed across the field. Approximately 400-600 data points were recorded in a typical 40-acre field. The EM-38 data was then statistically evaluated, and 6 sites within each field were selected for sampling. Soil samples were collected in depth-increments of 1 foot to a depth of four feet. This resulted in four samples being collected at each sample location, or a total of 24 samples per field. The samples were tested by SWWI for pH, electrical conductivity of the soil saturation extract, sodium adsorption ratio of the soil saturation extract, saturation percent , and percent moisture. Correlations were then established between the lab test results and the field EM-38 readings, which permitted the calculation of soil salinity (in depth-increments of 1 foot) at each of the 400-600 EM-38 data-collection points.

Since the soil salinity data are spatially referenced, accurate maps can be prepared for (1) soil salinity levels at any depth-increment to a depth of four feet; (2) average root zone soil salinity; and (3) approximate yield losses due to soil salinity within a field for numerous crops. Often, the EM-38 data in this project correlated well with other soil conditions, such as moisture content and clay content (saturation percent). In those cases, maps can be made of moisture content with depth throughout a field; relative clay content across a field at various depths; and the approximate leaching fraction occurring in the field under the existing management.

Figure 1: Location of Fields

Figure 2: Location of Fields

Figure 3: Location of Fields

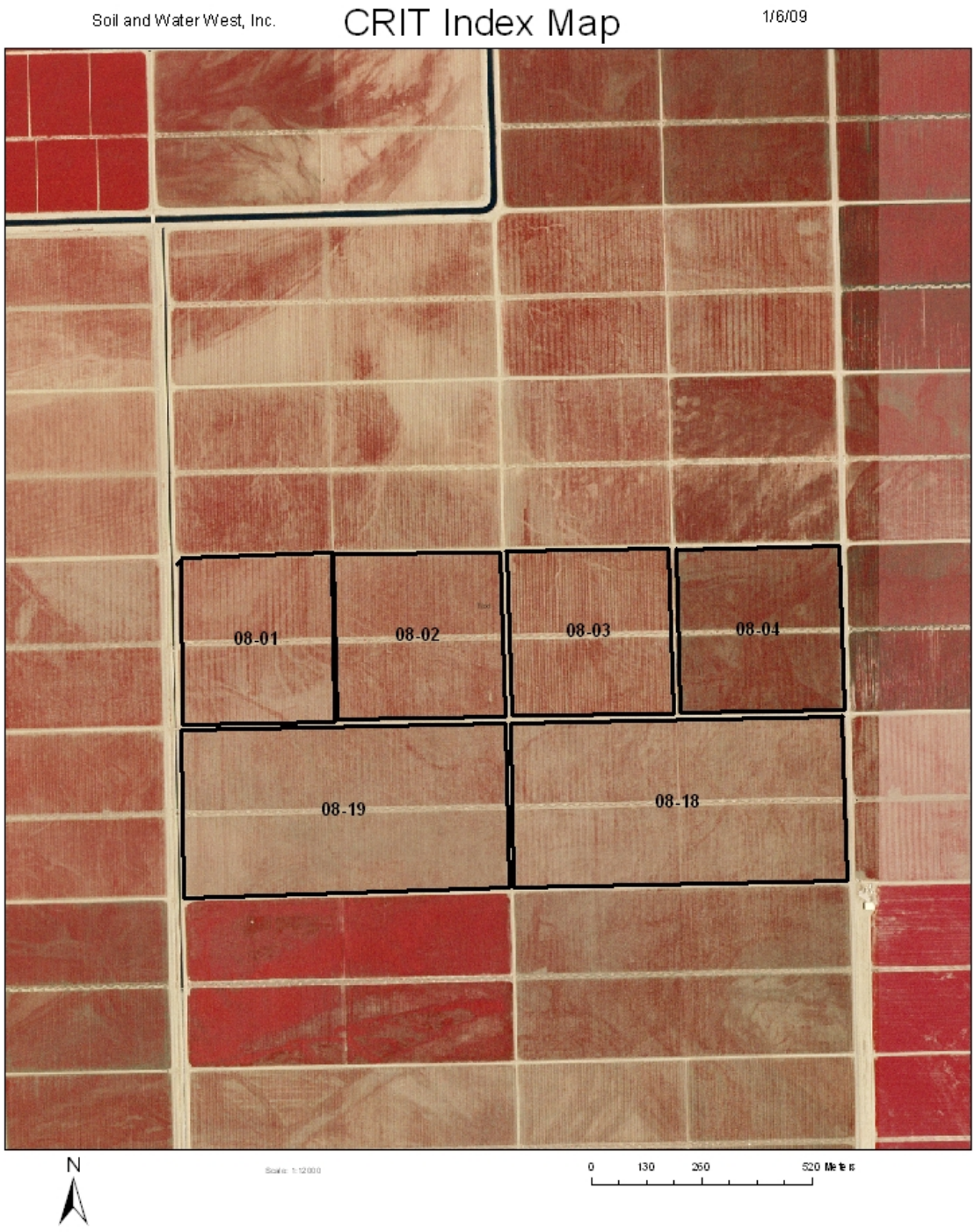


Figure 4: Location of Fields

3.0 Results

3.1 Summary of Results

Table 3.1 summarizes the results of this study. A brief discussion of the conditions observed in each field follows in Section 3.1

Table 3.1: Fields 1-7

FIELD NO.	1	2	3A	3B	4A	4B	5	6	7
Avg. ECe (mS/m)									
0-12”	148.5	176	167	210	112	91	2110	231	-
12-24”	153.2	209	161	299	109	132	359	366	3193
24-36”	187.8	241	254	271	82	112	259	386	-
36-48”	178.2	210	270	296	79	85	236	210	1418
Avg. 0-48”	167.0	210	213	269	88	105	1635	299	2305
Estimated LF (%)	27	24	18	20	45	37	NA	13	NA
Est. Crop Yield Loss (%)									
Alfalfa	5	10	10	15	0	5	100	30	100
Small Grain	0	0	0	0	0	0	100	1	100
Cotton	0	0	0	0	0	0	100	1	100

Table 3.2: Fields 9-19

FIELD NO.	9	14	15	16	17	18A	18B	19A	19B
Avg. ECe (mS/m)									
0-12”	139	148	1333	391	617	143	143	200	219
12-24”	100	172	2035	858	802	166	202	220	309
24-36”	118	266	2523	1104	767	146	200	213	282
36-48”	102	243	2007	1294	869	178	219	182	299
Avg. 0-48”	115	207	2038	912	764	158	191	203	277
Estimated LF (%)	42	19	NA	4	6	28	23	24	17
Est. Crop Yield Loss (%)									
Alfalfa	5	15	100	70	50	5	10	10	20
Small Grain	0	0	82	44	27	0	0	0	0
Cotton	0	0	83	47	28	0	0	0	0

3.2 Assessment Results of Individual Fields

Following is a brief discussion of the most important findings of each field surveyed. Due to space limitations only a portion of the available data is presented, so if additional information is needed it can be provided. See the maps in Figures 1 through 4 for the location of the fields.

Field 1 (CR0801)

Figure 1a:

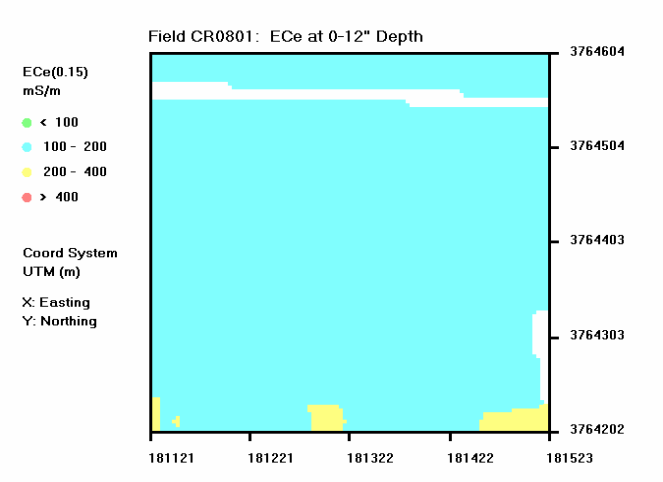


Figure 1b:

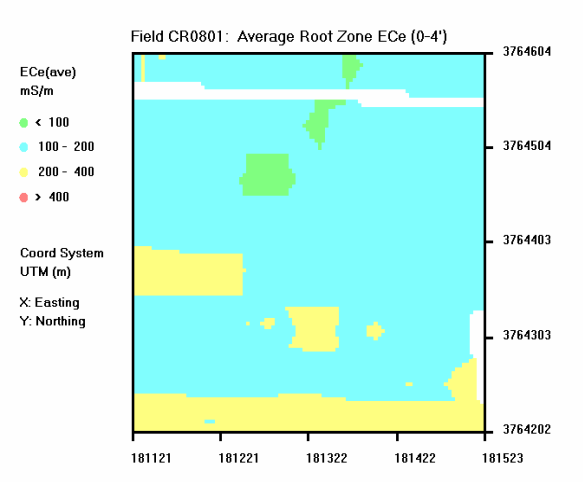


Figure 1c

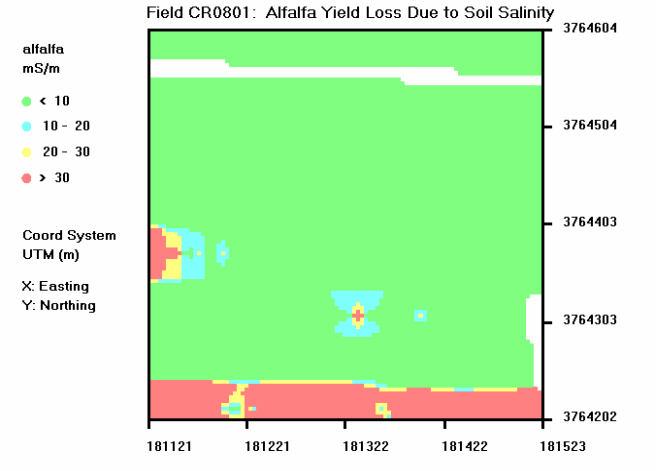
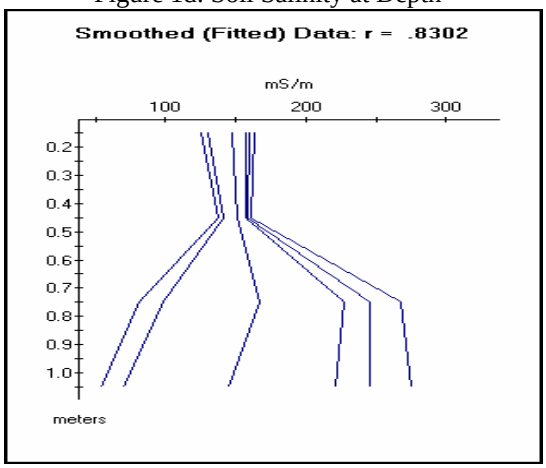


Figure 1d: Soil Salinity at Depth



This field is non-saline in the upper 12 inches across the entire field (Figure 1a). Near the road on the south side of the field, the subsoil is slightly saline (Figure 1b). Salinity may somewhat affect alfalfa yield along the south side (Figure 1c). The chart in Figure 1d shows salinity levels (mS/m) with depth at each of the six sites that were sampled in the field. It illustrates that three of the six sampled sites in this field had slightly elevated salinity in the lower portion of the root zone.

Field 2 (CR0802)

Figure 2a:

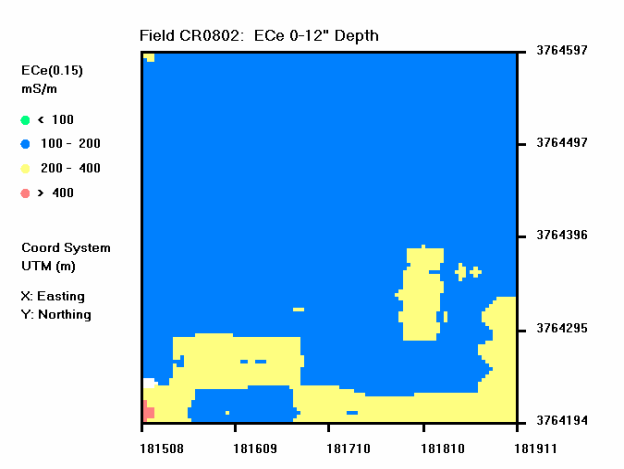


Figure 2b:

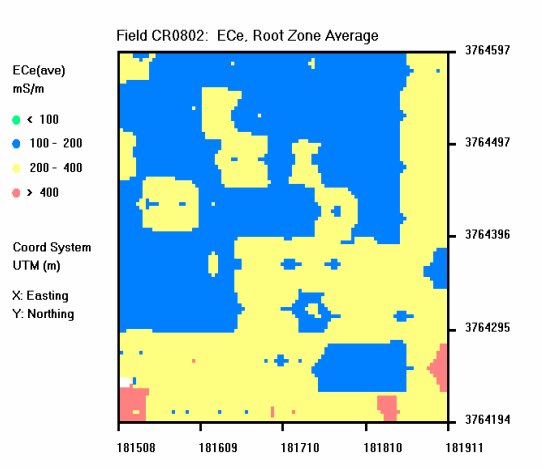
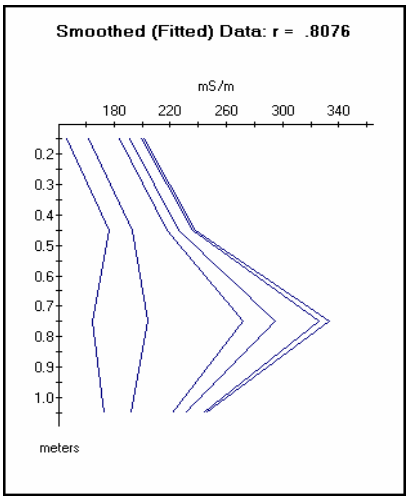


Figure 2d: Soil Salinity at Depth



Field 2 (CR0802) is adjacent to and east of field 1 (CR0801). Salinity levels are favorably low in the upper 12 inches across most of the field (Figure 2a). However the subsoil salinity, as illustrated in Figure 2b, is elevated across the extreme southern and eastern portions of the field. This is further illustrated in Figure 2d, which shows subsoil salinity levels exceeding 250 mS/m in four of the sampled sites at a depth of about .8 meters (2.5 ft.). Alfalfa begins to be adversely affected at salinity levels of 200 mS/m, and the map in Figure 2b indicates that yield loss for alfalfa may occur in these areas of the field. It should be noted that other crops (such as cotton, small grain, Bermuda grass, etc.) are not as salt-sensitive as alfalfa and, according to the data collected, these crops would not suffer any yield losses due to salinity.

It may be helpful to conduct additional leaching in this field to "push" the salts to a greater depth in the soil. Before leaching, it needs to be determined if a water table is present above 6 ft. depth, as this would interfere with leaching.

Field 3A (CR0803a) (South ½ of Field 3 on Location of Fields Figure 3)

Figure 3Aa:

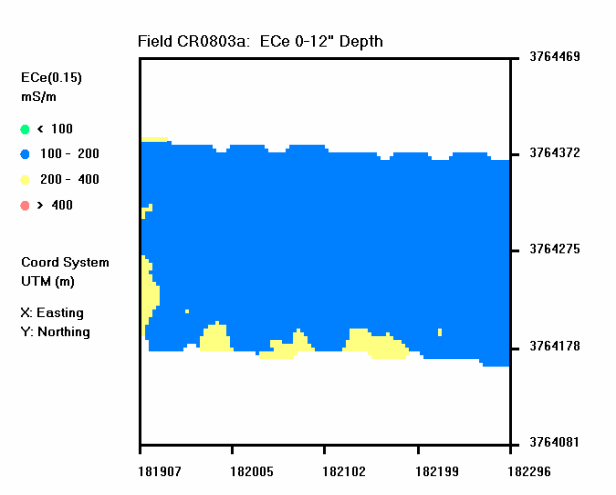


Figure 3Ab:

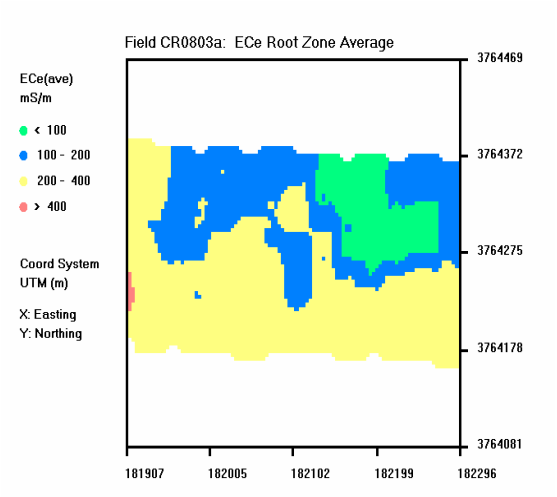
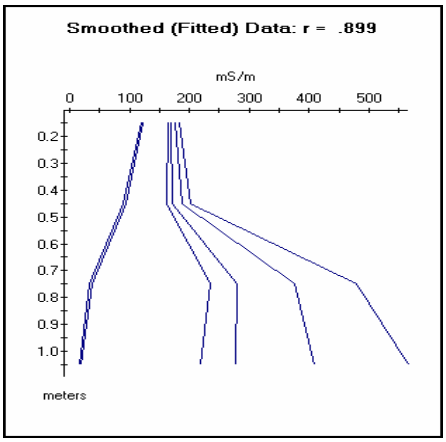


Figure 3Ad: Soil Salinity at Depth



Field 3A (CR0803a) is similar to Field 2 in that the surface soil is nonsaline, but the subsoil has slightly elevated salinity content on much of the field. Yield loss is estimated to be about 10% for alfalfa. Other more tolerant crops would not be affected. Again, the yield losses seem to be concentrated on the south side of the field near the road (as with fields 1 and 2). Similarly, the salinity level in the upper 12 inches is low, but it is higher at 2.5 to 4 ft depths. Additional leaching may be helpful in this field, provided no obstruction (i.e. water table or clay strata) to leaching exists to a depth of at least 6 feet below the surface.

Field 3B (CRo803b) (North ½ of Field 3 on Location of Fields Figure 3).

Figure 3Ba:

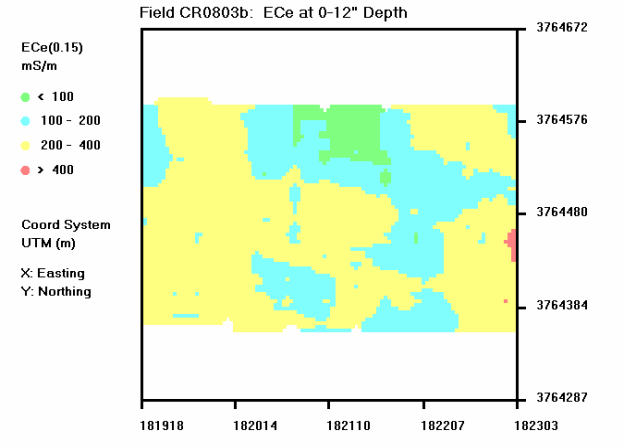


Figure 3Bb:

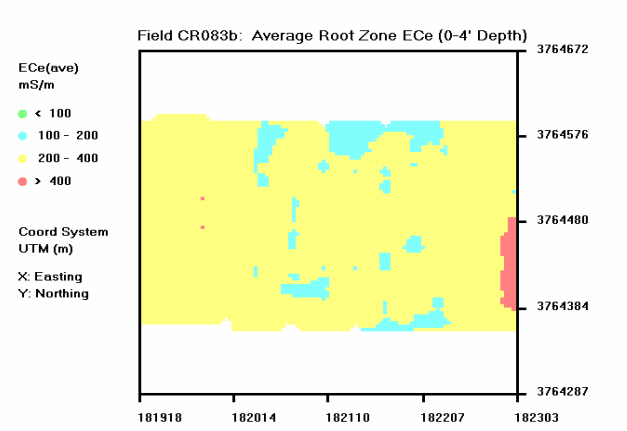
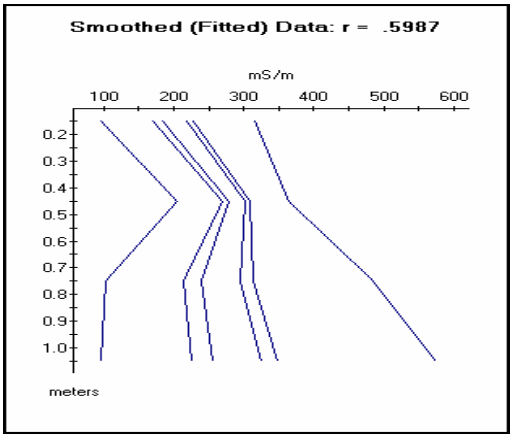


Figure 3Bd: Soil Salinity at Depth



The data for Field 3B (CR0803b) suggests about 20% alfalfa yield loss may occur due to soil salinity. Crops that are more tolerant to salinity (cotton, Bermuda, small grain, etc.) would not be affected and would have the potential for full yields. When the field survey was done on this field, there was no visual evidence of soil salinity. The soil is medium-textured, the field is in excellent condition, and soil moisture was good throughout the soil. The soil salinity is between 200 mS/m and 400 mS/m across much of the field in the surface and in the subsoil. Salinity begins to adversely affect alfalfa at 200 mS/m. Salinity levels could be reduced by deep leaching, provided that there is no underlying water table or clay strata to prevent downward movement of leaching water.

Field 4A (CR0804a) (South ½ of Field 4 on Location of Fields Figure 3)

Figure 4Aa:

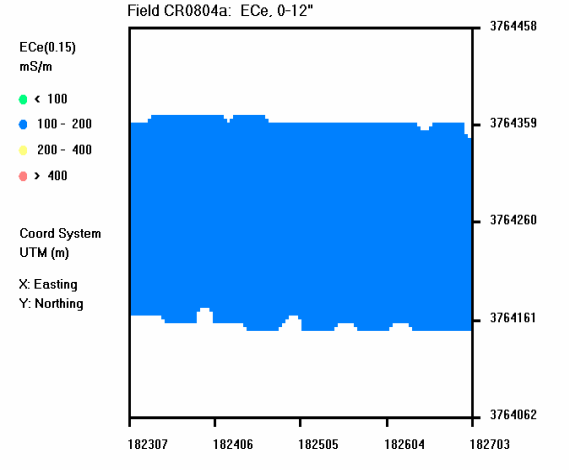


Figure 4Ab

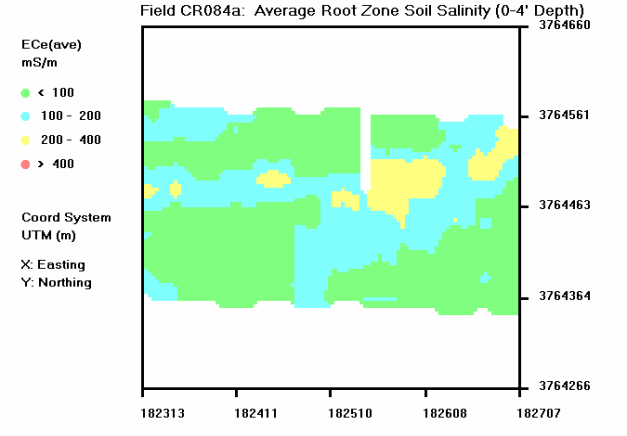
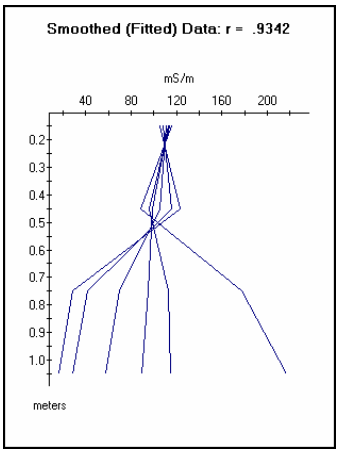


Figure 4A c: Soil Salinity at Depth



This field is nonsaline throughout. No yield losses due to salinity occur even for the most sensitive crops. Compare the subsoil salinity levels for the samples collected in this field (Figure 4Ac) with the similar charts in previous fields. The subsoil salinity is low throughout this field.

Field 4B (CR0804b) (North ½ of Field 4 on Location of Fields Figure 3)

Figure 4Ba:

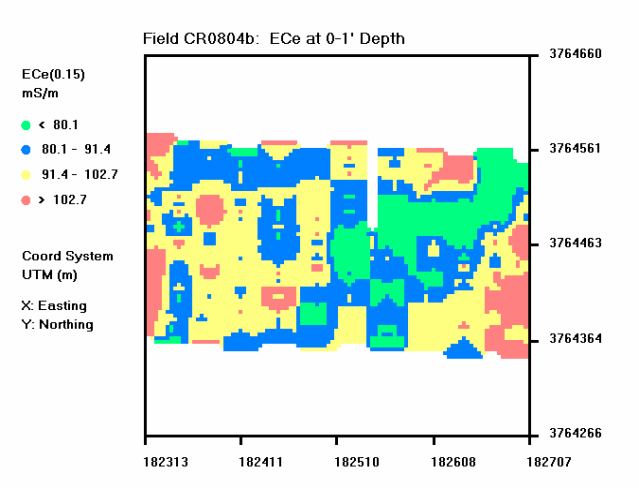


Figure 4Bb:

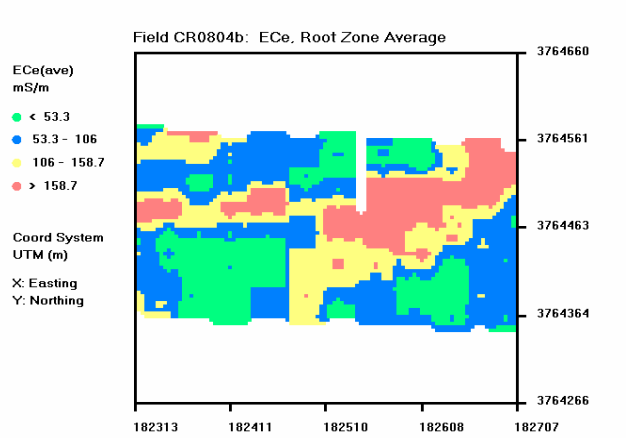
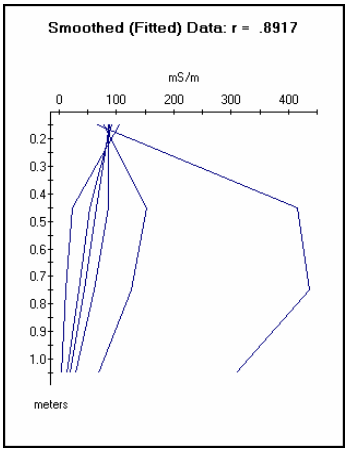


Figure 4Bc: Soil Salinity at Depth



This field is nonsaline throughout. Only minor yield losses due to salinity occur even for the most sensitive crops. The subsoil salinity is low throughout this field, although one of sampled sites showed elevated salinity at about 2 ft. depth. This condition did not occur across most of the field, however.

Field 5 (CR0805) (See Location of Fields Figure 4):

Figure 5a:

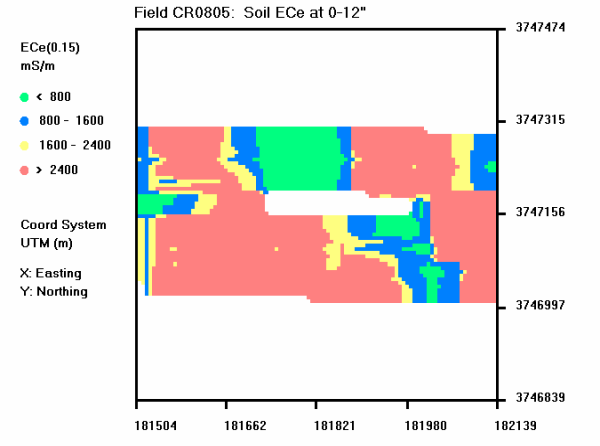


Figure 5b:

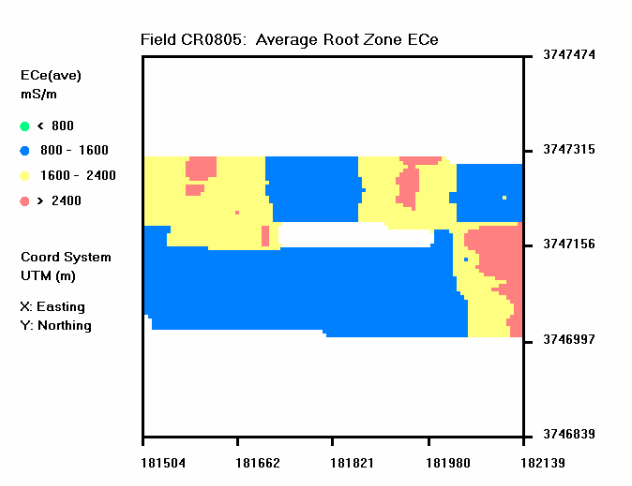


Figure 5c: Soil Salinity at Depth

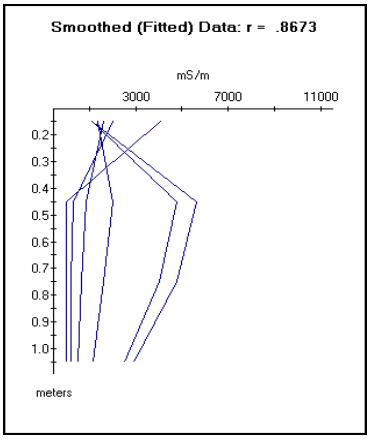
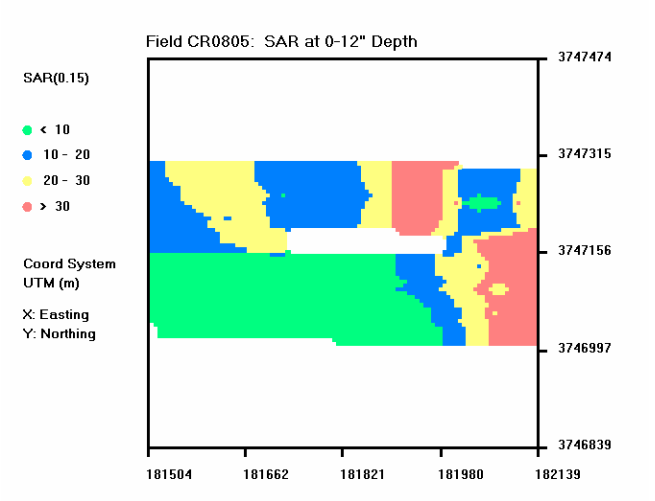


Figure 5d:



Field 5 (CR0805) is strongly saline throughout. Heavy yield losses will occur for any crop, and it is doubtful if alfalfa or other salt-sensitive crops can be grown at all. This field has a water table at a depth of 3 to 4 feet across most of the field, which is the underlying cause of the high salinity. Any remediation of this field will require removal of the water table (subsurface drainage). Additionally, there is no surface drainage for this field, so all of the water that is applied either has to infiltrate or stand. The field is about 3 to 4 feet lower in surface elevation than the field to the east, which causes a further hazard to salinization. In summary, this field is an excellent candidate for drainage improvement and could be brought back to productive status.

Field 6 (CR0806) (See Location of Fields Figure 4):

Figure 6a:

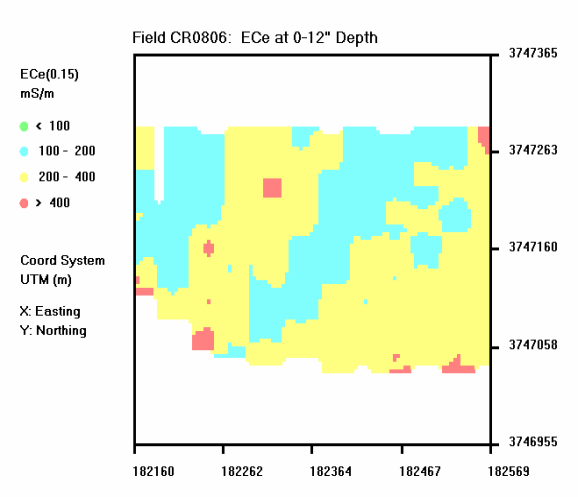


Figure 6b:

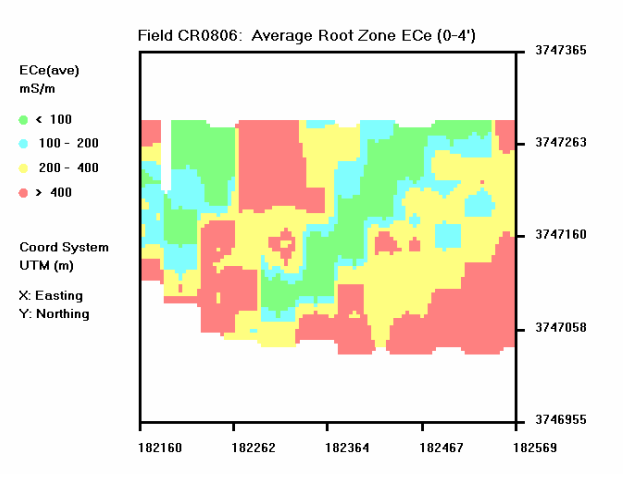
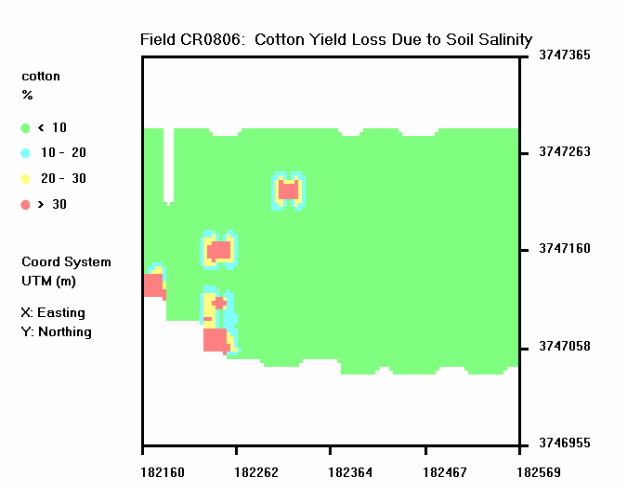


Figure 6c:



Field 6 (CR0806) is slightly to moderately saline across much of the field. The salinity may limit the productivity of salt-sensitive crops such as alfalfa (estimated 30% yield loss). Salt-tolerant crops such as cotton will not be affected by salinity. This field could be improved with leaching, provided that there is no barrier to the downward movement of leaching water to at least a depth of 6 feet. No water table was observed in this field to a depth of 4 feet when samples were taken, so it is likely that leaching will be successful. Part of this field also has elevated sodium adsorption ratio (SAR) levels. High SAR tends to reduce infiltration and permeability and make leaching difficult. The addition of sulfur or sulfuric acid would enhance the leaching process.

Field 7 (CR0807) (See Location of Fields Figure 4):

Figure 7a:

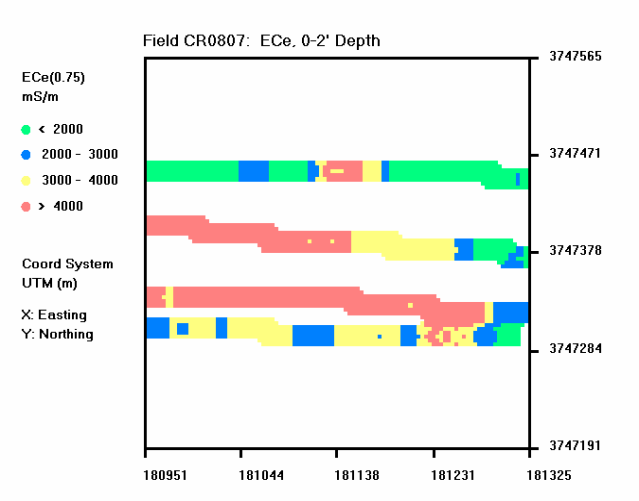


Figure 7b:

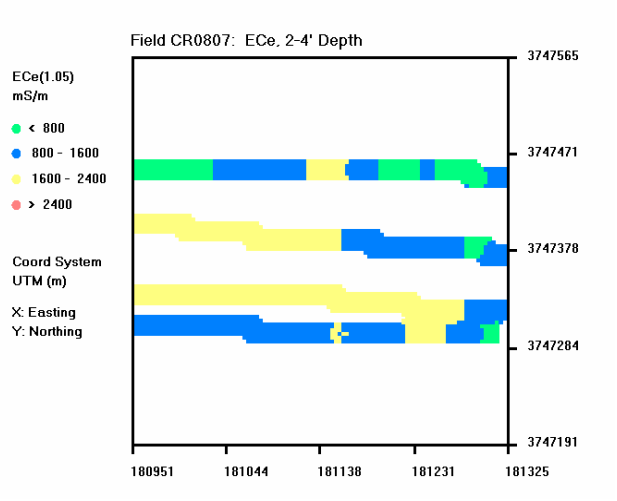
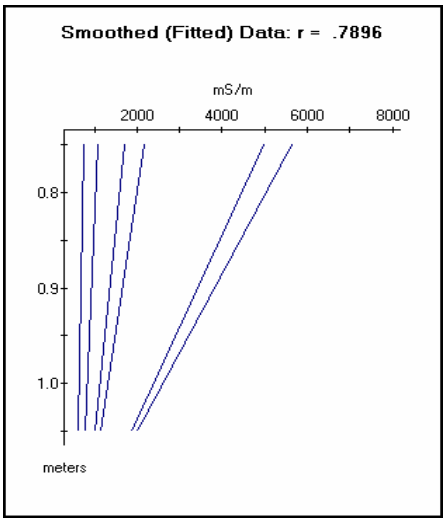


Figure 7c: Soil Salinity at Depth



This field is poorly drained with a high water table, and is strongly saline throughout. Due to the topographical position of this field, it will be very difficult to drain this field, which is the only remedy for the high salinity. No crops can be productively grown under the existing conditions, and there is no management practice available to the operator that is likely to succeed. Consideration may be given to retiring this field from agricultural production and assigning the area to an alternative use. (Note: due to the muddy conditions of this field, only four salinity transects could be done; hence the map on the this field is not completely filled as are the other maps.)

Field 9 (CR0809) (See Location of Fields Map No. 2:

Figure 9a:

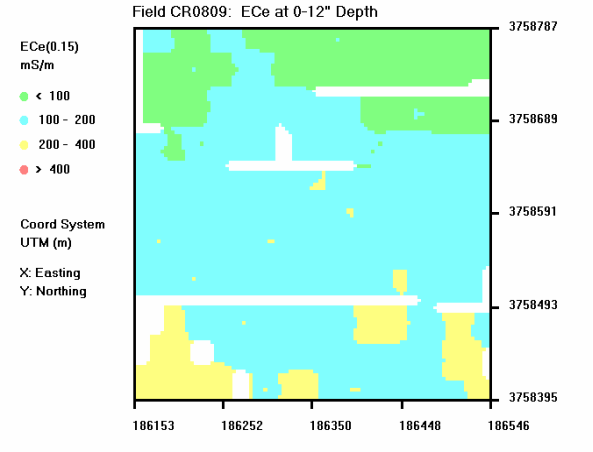


Figure 9b:

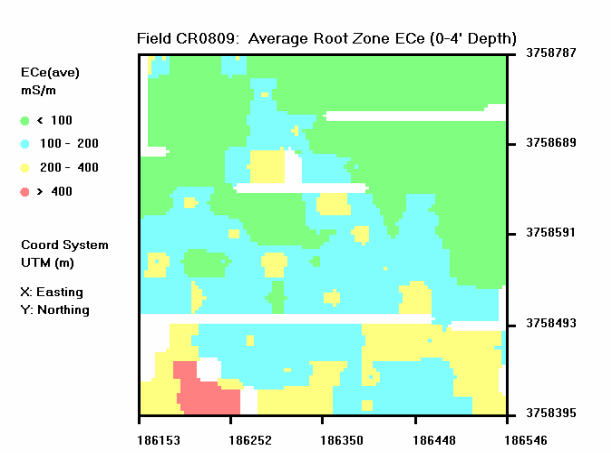


Figure 9c:

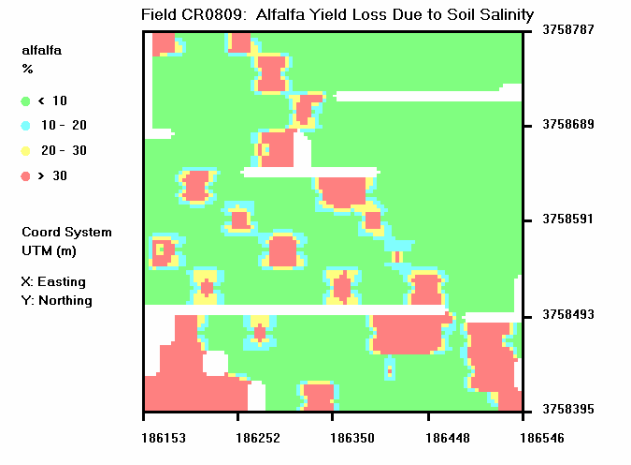
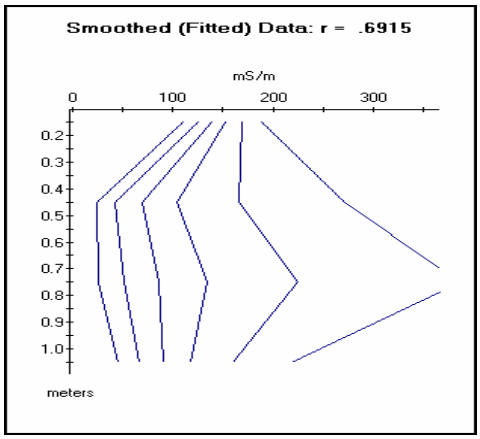


Figure 9d: Soil Salinity at Depth



Field 9 (CR0809) is slightly saline through part of the field, but on average this field is productive for even salt-sensitive crops such as alfalfa. The presence of a series of slightly saline areas extending diagonally across the field (see Figure 9c) may cause spotty stands of alfalfa in this area, but these are not extensive. These probably indicate the presence of an old slough that once crossed the area. It is noteworthy that the salinity of the field seems to increase from the north to the south (see Figure 9b). This could be a result of irrigation water distribution (uniformity of application or infiltration), and the operator should be aware that the southern half of the field seems to be a bit more saline than the north half.

Field 14 (CR0814) (See Location of Fields Map No. 2):

Figure 14a:

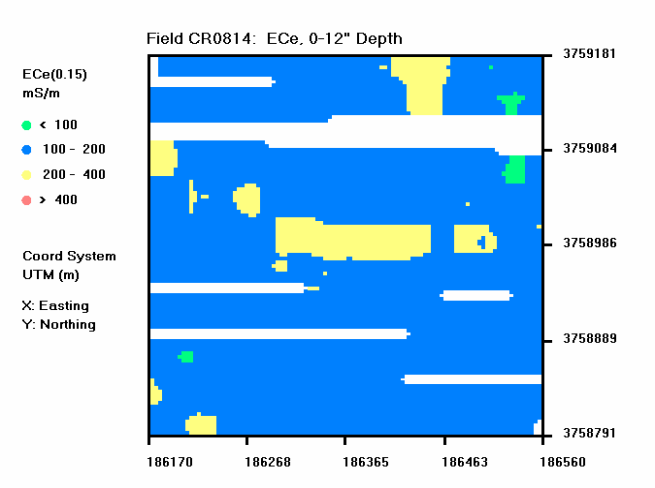


Figure 14b:

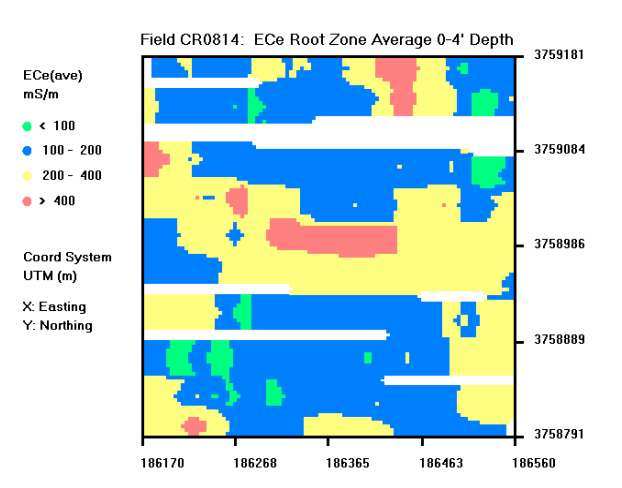


Figure 14c:

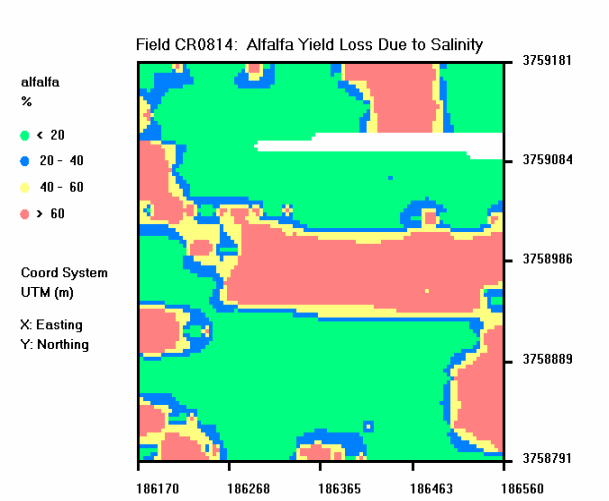
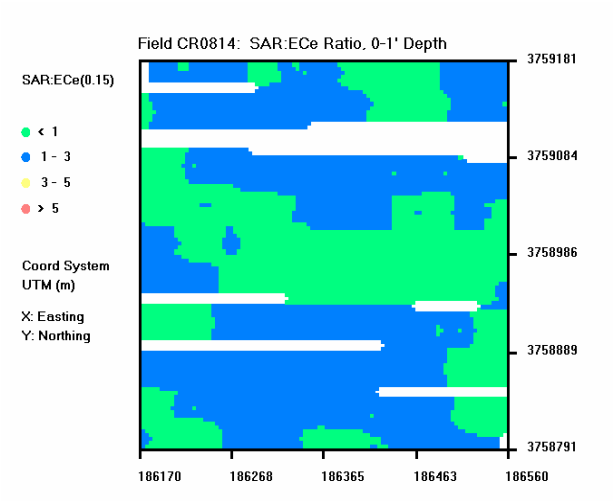


Figure 14d:



Field 14 (CR0814) is somewhat affected by salinity. Salt sensitive crops such as alfalfa will likely suffer yield losses due to salinity on the order of 15%. Crops that are not sensitive to salt, such as cotton, Bermuda, and small grain are not likely to suffer any losses. The pattern of salinity in this field indicates that the salinity is a result of soil type rather than anything that was irrigation-induced from water management. The pattern indicates that there is an area of soil, probably with slightly greater clay content, that extends across the field and affects the salinity. The operator may well choose to live with the limitations, and still the field is productive. Another alternative is to add an amendment (such as sulfur or sulfuric acid) to the soil in the affected areas and then leach the field. Gypsum, which often used for this purpose, is not recommended in this field and probably would not be effective here.

Field 15 (CR0815) (Location Map 1):

Figure 15a:

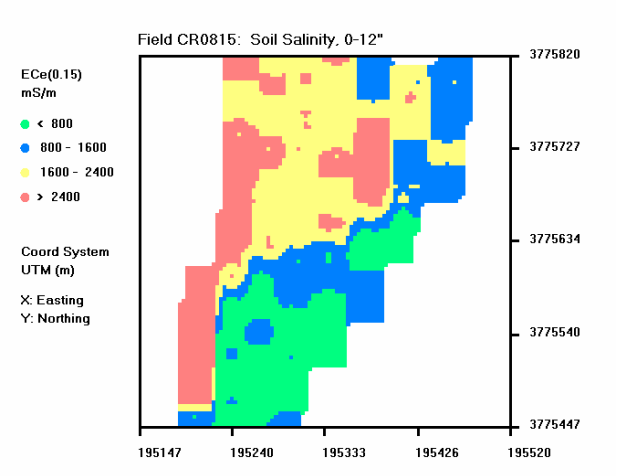


Figure 15b:

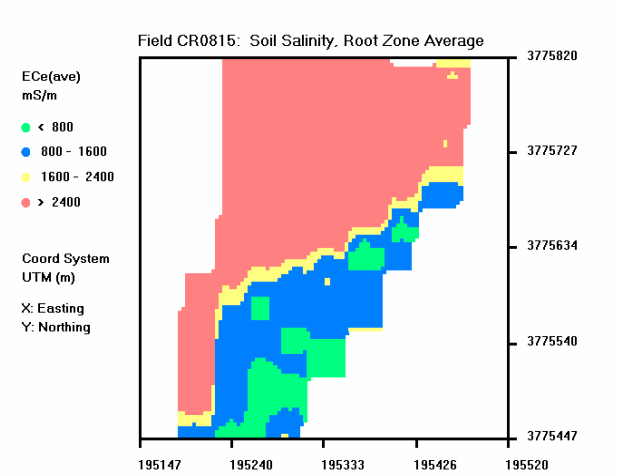


Figure 15c: Soil Salinity at Depth

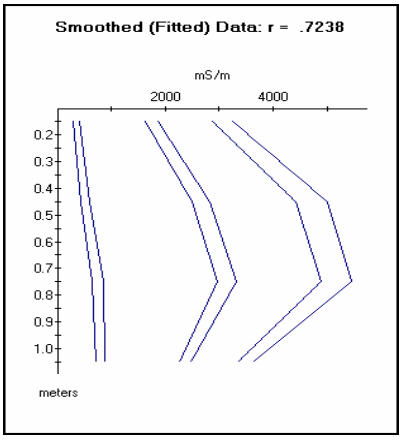
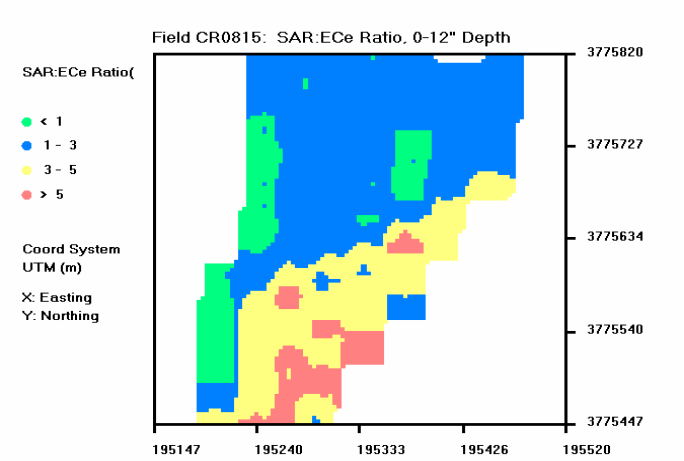


Figure 15d:



Field 15 (CR0815) is strongly saline throughout. The least saline part of the field is the southern one-third, but even this part of the field is too saline for even relatively salt-tolerant crops such as cotton or Bermuda grass. This field has wet subsoil, and possibly a water table within 5 to 6 feet of the surface. At the time of field data collection, part of the field had a perched water table occurring over a clay layer that extends across areas of the field at a depth of about 2 to 3 feet. The remediation of this field may be more costly than the benefits to be gained. It is a relatively small field, so the cost of improvements on a per acre basis will be high. The field could possibly be reclaimed by providing adequate drainage; adding appropriate amendments to the soil for removing the sodium; and leaching. Probably several growing seasons will be needed to improve the field to a productive level.

Field 16 (CR0816) (Location Map 1):

Figure 16a:

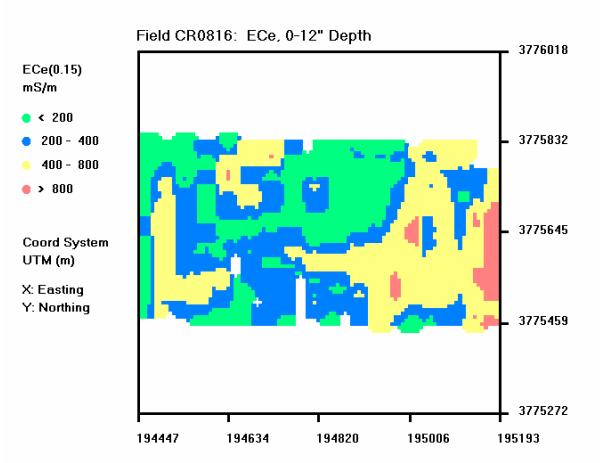
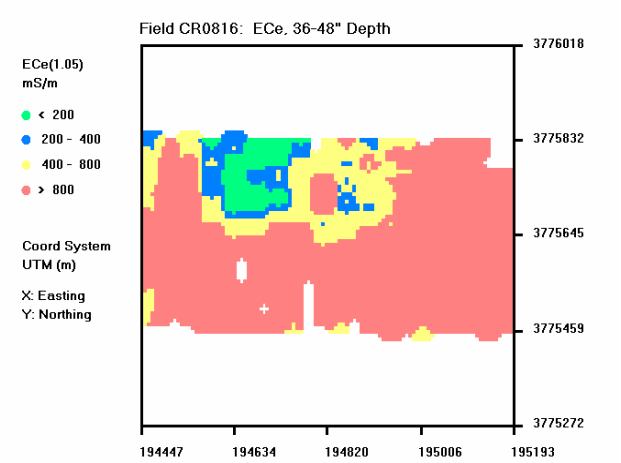
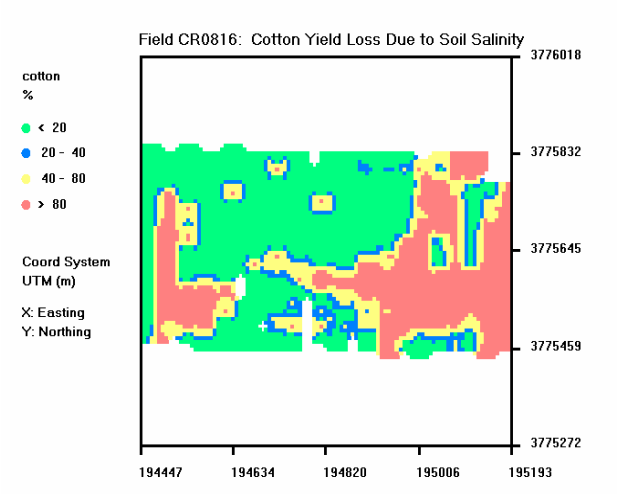


Figure 16b:





Field 16 (CR0816) is too saline for salt-sensitive crops such as alfalfa, but stands of Bermuda and small grain are likely possible. This field has the potential for improvement. It is clayey throughout and the clay limits the amount of water infiltration and leaching that can be accomplished. In order to improve the field and lower the salt content, it must be leached by water percolating through the soil and subsoil to move the salt out of the root zone. Any practice that enhances infiltration and permeability will be beneficial. These include the addition of organic matter to the surface, and possibly the application of elemental sulfur or sulfuric acid to the soil. No water table was observed in this field, and the salt distribution does not indicate that poor drainage is the cause of the salinity. Consequently, it is not likely that installation of subsurface drainage facilities would help the salinity problem in this field.

Field 17 (CR0817) (Field Location Map 1):

Figure 17a:

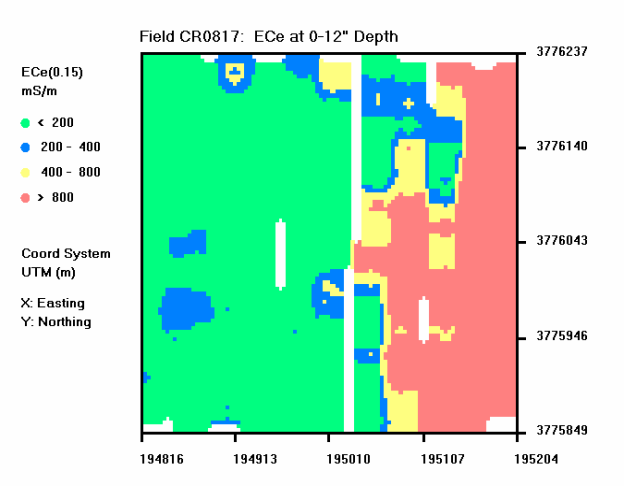


Figure 17b:

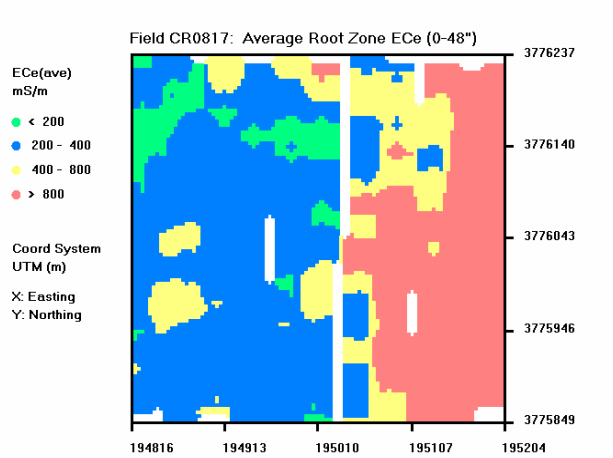


Figure 17c:

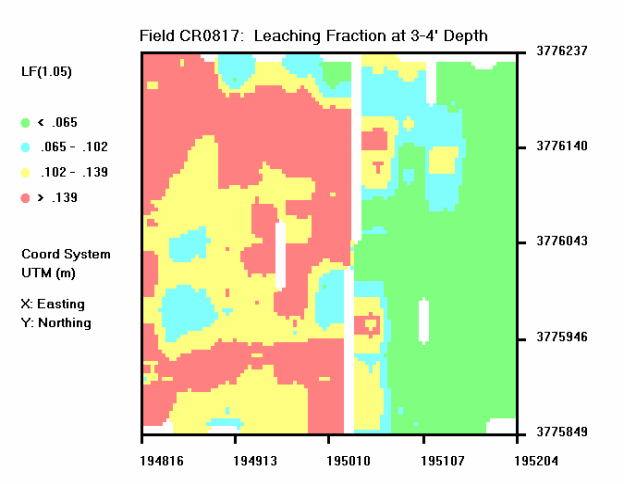
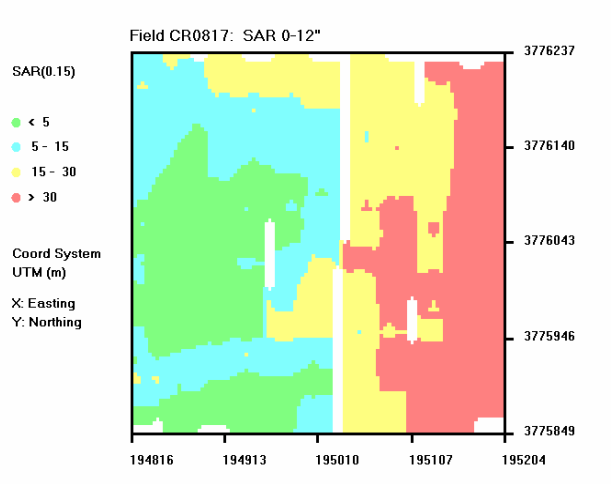


Figure 17d:



Field 17 (CR0817) is moderately to strongly saline. In looking at the salinity distribution, this field actually appears to be two fields, divided slightly to the east of center. The eastern portion (nearest the road) is strongly saline and sodic in most areas. The western portion of the field is less saline, although it is still salt-affected. This field will probably not produce a suitable yield of alfalfa due to the salt, but could produce reasonable yields of the more salt-tolerant crops such as Bermuda grass, certain small grains, and cotton. As indicated in Figure 17c (Leaching Fraction at 3-4' Depth), this field is difficult to leach adequately. The poorest part of the field has an estimated leaching fraction of less than 10 percent, which is probably not adequate to maintain a satisfactory salt balance in the soil. The high sodium adsorption ratio (SAR, Figure 17d) that also occurs in the eastern portion of the field contributes to the difficulty in leaching by reducing infiltration. It is probable that this area is prone to ponding, due in large part to the high sodium content of the surface. Any practice that improves infiltration and increases the movement of water down through the profile will be beneficial. These include increasing the

organic matter content of the surface soil, and possibly the addition of sulfur or sulfuric acid to the area that has high sodium.

Field 18A (CR0818a) (Field Location Map 3):

Figure 18Aa:

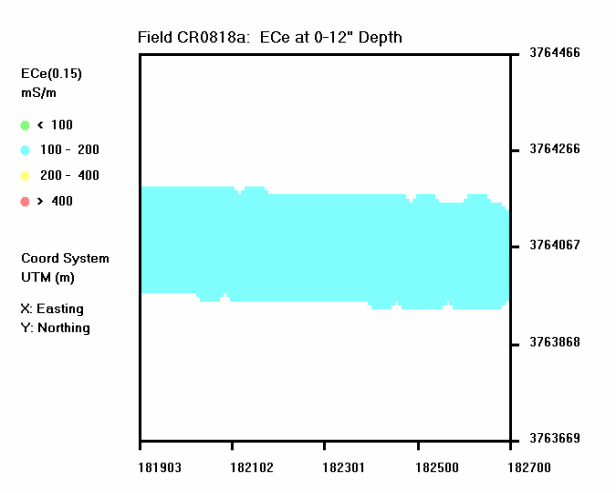


Figure 18Ab:

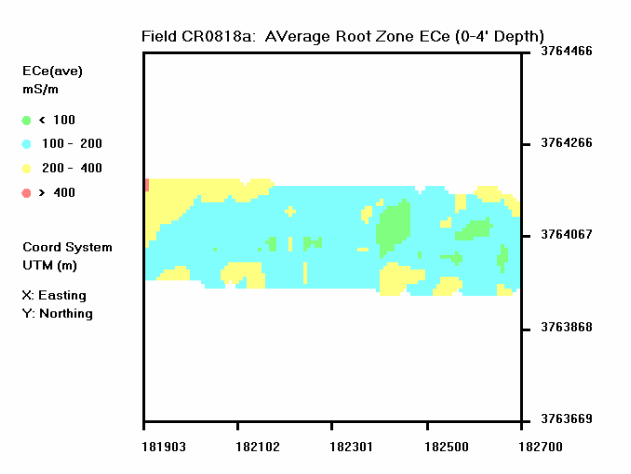
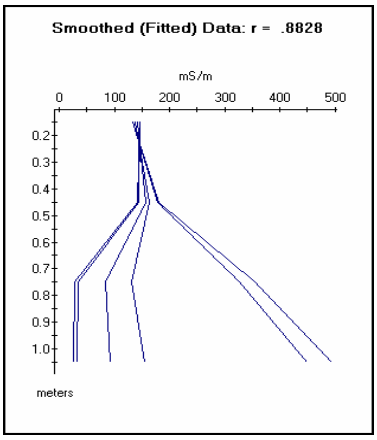


Figure 18Ac: Soil Salinity With Depth



Field 18A (CR0818a) is the north half of field 18 shown on the Location of Fields Map No. 3. This field is nonsaline throughout. Only minor yield losses due to salinity occur even for the most sensitive crops. A small area in the northwest corner of the field is slightly salt-affected, but this area is minor and does not greatly affect the overall productivity of the field.

Field 18B (CR0818b) (Field Location Map 3):

Figure 18Ba:

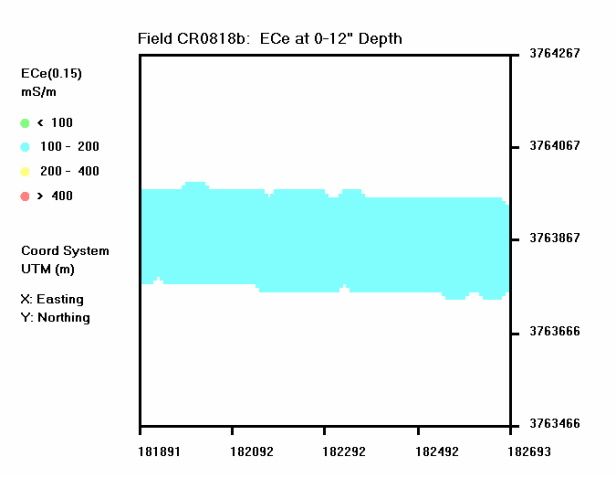


Figure 18Bb

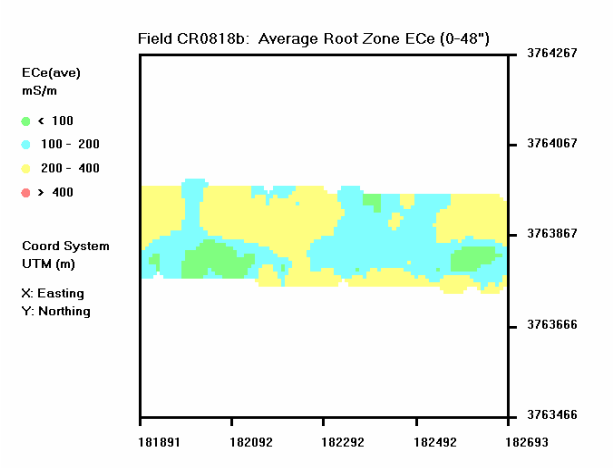
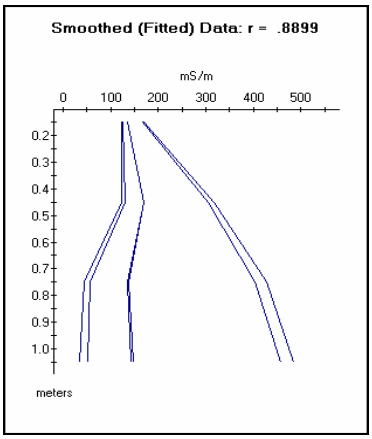


Figure 18Bc: Soil Salinity With Depth



Field 18B (CR0818B) is the south half of field 18 shown on the Location of Fields Map number 3. The soil is nonsaline in the upper foot throughout the field. As Figure 18Bb indicates, the subsoil (12 to 48 inches) is slightly saline across about half of the field, and this is the cause of the estimated 10% alfalfa yield loss. Figure 18Bc further illustrates this pattern, as two of the six sites that were sampled had salinity levels of more than 400 mS/m in the lower part of the root zone. Application of periodic leaching water will be helpful in maintaining the low salinity levels in the root zone of this field.

Field 19A (CR0819a) (Field Location Map 3):

Figure 19Aa:

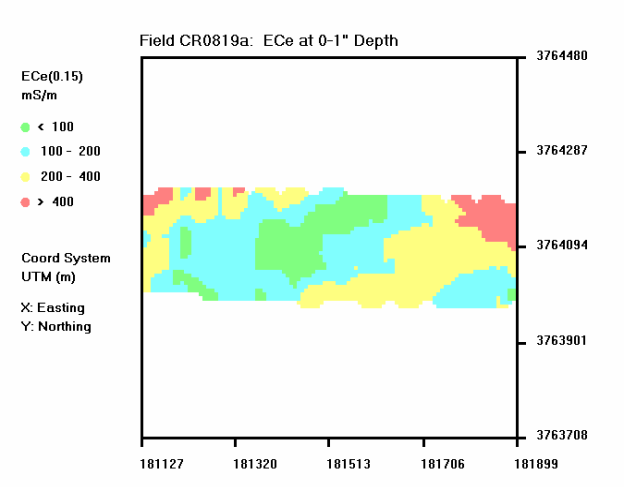


Figure 19Ab:

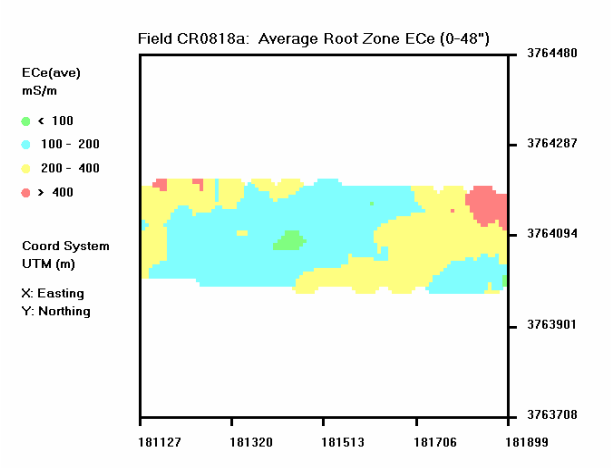
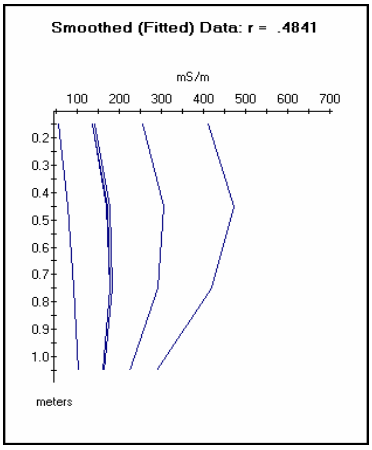


Figure 19Ac: Soil Salinity With Depth



Field 19A (CR0819a) is the north half of field 19 shown on the Location of Fields Map number 3. This field is nonsaline across the interior part of the field, but is slightly to moderately saline on the east and west extremities. Alfalfa yields are estimated to be reduced by about 10 percent (field-wide average), due primarily to these two areas of saline soils. The cause of the salinity in these two areas is not evident, although both sites are adjacent to road intersections. Figure 19Ac above indicates that there is a salinity "bulge" on two of the six sampled sites between the depths of about 0.4 to 0.8 meters (16-32 inches).

Field 19B (CR0819b) (Field Location Map 3):

Figure 19Ba:

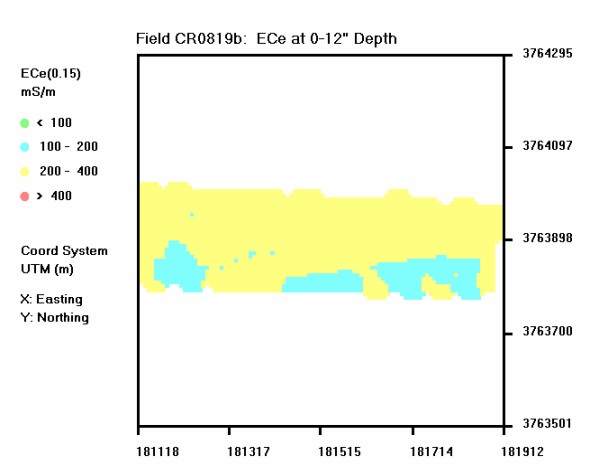


Figure 19Bb:

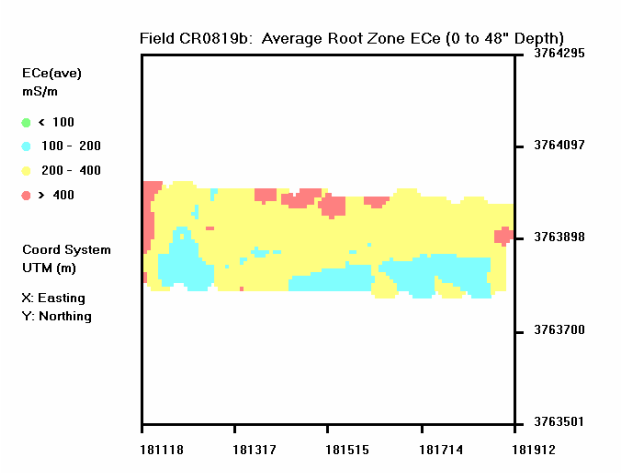
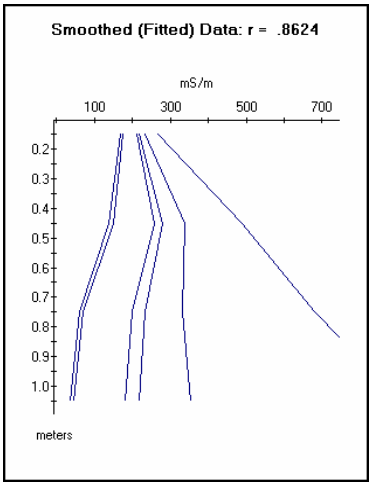


Figure 19Bc: Soil Salinity With Depth



Field 19B (CR0819b) is the south half of field 19 as shown on the Location of Fields Map number 3. It is estimated that this field has about 20 percent of alfalfa yield loss due to soil salinity. The salinity is not high enough to affect the production of other more salt-tolerant crops such as cotton or Bermuda grass. The northern portion of the field and the extreme western portion are where most of the losses occur (see Figure 19Bb above). Similar patterns do not occur in the field immediately to the north (19A). No water table was observed in this field during the field sampling, although the subsoil was moist. Leaching this field would probably be beneficial.

Section 4.0 Laboratory Data

Soil samples were collected at each field included in this study. With the exception of one field (Field 7), six sites within each field were sampled to a depth of four feet in depth-increments of one foot. This resulted in 24 soil samples per field. In Field 7, six sites were sampled to a depth of four feet in depth-increments of two feet, resulting in 12 samples collected in this field. Field 7 was sampled in depth-increments of two feet because the wet and saline conditions in this field made it impractical to sample in smaller increments. This did not affect the results, as this field was extremely saline throughout.

The following pages present the laboratory test results for each field. The coordinates (UTM) of each sample site are available if requested.

Field 1 (CR0801)

SOIL TEST RESULTS
FIELD NAME: CRIT08-01

Sample Number	Depth (Inches)	pH (Sat.Paste)	Saturation Percent	ECe (dS/m)	SAR Extract	Percent Moisture by Wt.
55	0 to 12	7.95	41.5	1.38	5.05	11.85
55	12 to 24	7.96	45.3	1.41	3.08	13.16
55	24 to 36	8.2	30.4	1.63	5.28	13.04
55	36 to 48	8.3	32.9	1.69	3.44	17.28
100	0 to 12	7.96	32.4	1.38	12.2	9.8
100	12 to 24	7.93	29.9	1.57	13.2	10.19
100	24 to 36	8.39	28.5	0.827	5.04	6.92
100	36 to 48	8.25	29.5	0.71	3.47	5.53
118	0 to 12	8.02	35.2	1.47	4.35	10.41
118	12 to 24	8.21	33.5	1.24	4.35	13.85
118	24 to 36	7.98	43.8	2.58	8.31	15.3
118	36 to 48	7.86	46.4	3.25	3.76	14.26
132	0 to 12	7.83	38.4	1.82	8.09	11.09
132	12 to 24	8.04	35.9	1.96	6.31	14.34
132	24 to 36	8.25	31.4	1.99	6.71	14.37
132	36 to 48	8.01	39.1	2.71	6.84	14
284	0 to 12	7.93	38.2	1.23	5	9.85
284	12 to 24	8.07	32.9	1.3	5.17	11.18
284	24 to 36	8.28	31.1	0.898	2.53	8.24
284	36 to 48	8.5	35.2	0.518	0.71	10
345	0 to 12	7.91	36.9	1.57	5.52	10.08
345	12 to 24	8.16	32.9	1.67	3.12	12.99
345	24 to 36	8.31	35.2	3.18	7.76	15.81
345	36 to 48	7.85	32.2	1.49	0.153	13.85

Field 2 (CR0802)

SOIL TEST RESULTS
FIELD NAME: CRIT08-02

Sample Number	Depth (Inches)	pH (Sat.Paste)	Saturation Percent	ECe (dS/m)	SAR Extract
128-1	0 to 12	8.01	31.6	1.78	11
128-2	12 to 24	8.03	28.4	2.34	3.77
128-3	24 to 36	7.85	36.9	2.41	1.81
128-4	36 to 48	7.95	39.3	2.13	1.21
155-1	0 to 12	8	33.5	1.53	4.84
155-2	12 to 24	7.87	39.3	1.51	0.777
155-3	24 to 36	7.96	41.7	1.83	1.12
155-4	36 to 48	7.42	46	1.74	0.833
272-1	0 to 12	7.84	35.5	2.33	7.39
272-2	12 to 24	7.92	44	2.06	2.11
272-3	24 to 36	7.91	36.2	3.05	3.4
272-4	36 to 48	7.97	41.5	2.55	1.44
340-1	0 to 12	7.71	34.8	2.1	4.03
340-2	12 to 24	7.9	42.7	2.22	0.964
340-3	24 to 36	7.97	36.2	3.55	1.4
340-1	36 to 48	8.22	34.7	2.37	0.841
359-1	0 to 12	7.89	37.6	1.56	2.87
359-2	12 to 24	7.93	36.9	2.32	2.3
359-3	24 to 36	7.92	41.3	3.43	1.87
359-4	36 to 48	7.89	37.5	2.36	2.24
376-1	0 to 12	7.94	40.5	1.61	1.82
376-2	12 to 24	7.9	32.7	2.23	8.13
376-3	24 to 36	7.93	45.7	1.78	7.12
376-4	36 to 48	7.92	38	1.92	13.3

Field 3A (CR0803a)

SOIL TEST RESULTS
FIELD NAME: CRIT08-3a
DATE SAMPLED:

Sample Number	Depth (Inches)	pH (Sat.Paste)	Saturation Percent	ECe (dS/m)	SAR Extract	Percent Moisture by Wt.
31-1	0 to 12	7.88	35	1.45	1.9	13.09
31-2	12 to 24	8.05	35.9	0.605	1.68	10.78
31-3	24 to 36	8.2	38.8	0.363	1.72	10.24
31-4	36 to 48	8.58	38.2	0.176	1.97	7.9
48-1	0 to 12	7.99	41.3	1.63	3.04	15.38
48-2	12 to 24	8.02	42.5	2.43	2.81	26.88
48-3	24 to 36	7.93	56	4.69	2.78	26.41
48-4	36 to 48	7.97	45.5	5.4	2.96	23.12
71-1	0 to 12	8.02	37.1	1.07	1.89	11.02
71-2	12 to 24	8.01	32.5	1.43	1.36	15.21
71-3	24 to 36	8.44	39.9	0.325	1.95	9
71-4	36 to 48	8.43	38.4	0.167	2	9.95
122-1	0 to 12	7.72	42.1	2.53	2.83	16.19
122-2	12 to 24	8.08	63.7	1.14	4.05	21.59
122-3	24 to 36	8.05	40.7	3.62	2.06	22.02
122-4	36 to 48	8.11	35.7	2.14	2.66	14.34
211-1	0 to 12	7.85	41.7	0.907	1.65	11.81
211-2	12 to 24	8.14	42.3	2.06	2.02	25.52
211-3	24 to 36	8.18	35.3	2.68	1.68	45.69
211-4	36 to 48	8.15	31.1	2.72	27.4	16.64
294-1	0 to 12	7.74	36	2.26	3.08	13.05
294-2	12 to 24	8.15	41.3	1.77	2.9	22.91
294-3	24 to 36	8.17	52.2	2.8	2.88	26.05
294-4	36 to 48	7.9	33	4.55	3.08	22.31

Field 3B (CR0803b)

SOIL TEST RESULTS
SITE: CRIT08 03b

Sample Number	Depth (Inches)	pH (Sat.Paste)	Saturation Percent	ECe (dS/m)	SAR Extract	Percent Moisture by Wt.
03b-28-1	0 to 12	7.76	35.3	3.77	11.1	12.1
03b-28-2	12 to 24	7.81	31.1	5.24	21.3	12.77
03b-28-3	24 to 36	8.05	31.4	1.82	19.7	11.23
03b-28-4	36 to 48	8.02	35.2	2.15	19.5	15.16
03b-49-1	0 to 12	7.89	30.8	2.02	19.7	11.18
03b-49-2	12 to 24	7.86	35.9	3	15	12.69
03b-49-3	24 to 36	7.84	39.5	3.1	18.5	14
03b-49-4	36 to 48	7.98	31.6	3.37	15.4	14.39
03b-156-1	0 to 12	7.92	33	1.2	2.38	9.96
03b-156-2	12 to 24	8.02	31.1	2.11	5	12.28
03b-156-3	24 to 36	8.38	31.4	0.918	1.84	9.3
03b-156-4	36 to 48	8.47	33.5	0.825	1.07	10.93
03b-229-1	0 to 12	7.98	34.8	1.29	9.52	10.61
03b-229-2	12 to 24	8.14	34.7	2.02	5.4	14.51
03b-229-3	24 to 36	7.9	36.2	2.94	7.98	12.79
03b-229-4	36 to 48	7.76	55.8	2.92	4.41	15.35
03b-297-1	0 to 12	7.99	32.9	1.23	10.3	7.97
03b-297-2	12 to 24	8.11	29.9	2.63	21.6	13.61
03b-297-3	24 to 36	8	35.3	2.84	11.5	12.34
03b-297-4	36 to 48	8.02	36	3.43	9.24	14.45
03b-337-1	0 to 12	7.84	35.2	3.32	12.6	8.46
03b-337-2	12 to 24	8.02	34.2	2.97	13.9	13.31
03b-337-3	24 to 36	7.85	37.8	5.44	9.86	14.4
03b-337-4	36 to 48	7.98	32.5	5.98	0.00179	13.42

Field 4A (CR0804a)

SOIL TEST RESULTS
FIELD NAME: CRIT08-4a

Sample Number	Depth (Inches)	pH (Sat.Paste)	Saturation Percent	ECe (dS/m)	SAR Extract	Percent Moisture by Wt.
43-1	0 to 12	8.12	42.3	1.13	2.9	15.34
43-2	12 to 24	8.45	62.4	0.97	7.55	21.19
43-3	24 to 36	8.39	50.7	1.59	9.32	18.94
43-4	36 to 48	8.18	45.5	2.27	7.01	25.69
71-1	0 to 12	7.74	41.1	0.881	5.43	9.97
71-2	12 to 24	7.94	34.5	1.56	2.62	15.99
71-3	24 to 36	8.36	36.7	0.247	1.58	5.01
71-4	36 to 48	8.44	47.1	0.183	2.09	5.23
184-1	0 to 12	7.61	36.2	1.29	2.03	11.29
184-2	12 to 24	7.82	54.4	0.852	2.87	16.74
184-3	24 to 36	8.02	43.1	0.648	2.83	20.06
184-4	36 to 48	8.12	27.4	0.66	1.73	8.68
251-1	0 to 12	7.59	40.9	0.936	3.02	10.76
251-2	12 to 24	7.84	38.2	1.38	3.13	17.69
251-3	24 to 36	7.88	50.7	0.99	4.02	23.29
251-4	36 to 48	7.95	66.7	1.1	5.03	26.39
283-1	0 to 12	7.64	37.6	1.25	2.68	12.48
283-2	12 to 24	8.03	44.4	1.03	3.16	20.42
283-3	24 to 36	8.23	42.3	0.476	3.04	12.35
283-4	36 to 48	8.61	42.7	0.237	2.48	11.02
315-1	0 to 12	7.66	42.5	1.24	3.51	13.76
315-2	12 to 24	7.85	55.5	0.688	3.48	22.03
315-3	24 to 36	8.02	35.3	1.33	3.07	18.33
315-4	36 to 48	8.12	42.7	0.834	3.08	22.05

Field 4B (CR0804b)

SOIL TEST RESULTS
FIELD NAME: CRIT08-4b

Sample Number	Depth (Inches)	pH (Sat.Paste)	Saturation Percent	ECe (dS/m)	SAR Extract	Percent Moisture by Wt.
34-1	0 to 12	7.95	40.7	0.651	1.94	10.32
34-2	12 to 24	8.13	43.8	0.39	1.27	7.17
34-3	24 to 36	8.24	37.3	0.484	1.3	13.47
34-4	36 to 48	8.46	40.7	0.203	1.42	9.89
97-1	0 to 12	7.81	44.4	1.09	2.9	15.16
97-2	12 to 24	8.14	53.8	0.934	4.06	20.89
97-3	24 to 36	8.34	36.6	0.937	2.86	21.58
97-4	36 to 48	8.84	38.2	0.141	1.79	8.19
165-1	0 to 12	7.86	46.2	0.96	3.34	13.86
165-2	12 to 24	8.06	41.9	1.36	5.32	16.48
165-3	24 to 36	8.58	33.8	0.351	3.53	6.34
165-4	36 to 48	8.81	36.4	0.111	1.51	4.42
179-1	0 to 12	7.79	35.5	1.22	2.54	12.81
179-2	12 to 24	7.96	45.1	1.04	2.96	19.8
179--3	24 to 36	8.02	38.6	0.98	3.41	12.98
179-4	36 to 48	8.11	35.9	0.838	2.71	11.32
236-1	0 to 12	7.9	34.8	0.949	1.96	10.31
236-2	12 to 24	8.28	35.9	0.193	1.53	7.4
236-3	24 to 36	8.76	34.5	0.0988	0.921	4.26
236-4	36 to 48	8.81	39.5	0.066	1.11	4.77
264-1	0 to 12	7.89	45.1	0.48	2.59	11.86
264-2	12 to 24	7.82	38.6	4.3	5.23	16.79
264-3	24 to 36	7.92	42.9	4.24	11.9	22.9
264-4	36 to 48	7.89	55.5	4.27	14.9	23.66

Field 5 (CR0805)

SOIL TEST RESULTS
SITE: CRIT08-05

Sample Number	Depth (Inches)	pH (Sat.Paste)	Saturation Percent	ECe (dS/m)	SAR Extract	Percent Moisture by Wt.
59	0 to 12	8.25	29.9	110	0.0398	7.54
59	12 to 24	8.59	36.7	0.0617	0.241	3.92
59	24 to 36	8.84	38.9	0.0436	0.402	3.55
59	36 to 48	8.72	32.9	0.064	0.588	10.2
79	0 to 12	8.18	28.2	10.2	2.72	8.92
79	12 to 24	8.14	25.3	34.6	14.2	19.87
79	24 to 36	8.05	28.8	40.7	24.7	18.82
79	36 to 48	7.99	35.2	38.2	23.5	33.68
145	0 to 12	8.02	32.7	5.14	4.27	11.48
145	12 to 24	8.22	27.4	6.54	6.23	11.04
145	24 to 36	8.4	29.4	2.68	5.1	15.84
145	36 to 48	8.19	27.9	2.96	5.99	16.49
189	0 to 12	7.96	49.7	31.6	47.4	13.62
189	12 to 24	8.02	99.4	16.5	18.6	30.46
189	24 to 36	7.98	101.9	12.3	14.3	17.39
189	36 to 48	7.97	53.3	7.91	8.85	23.2
236	0 to 12	7.71	29.4	42.1	30.2	10.01
236	12 to 24	7.64	34.5	50.2	43.9	24.23
236	24 to 36	7.63	33.3	33	41.8	18.74
236	36 to 48	7.78	98.8	12.3	19	28.44
256	0 to 12	8.1	35.2	2.87	1.44	9.92
256	12 to 24	7.99	70.7	10.6	3.37	30.22
256	24 to 36	7.92	55.8	13.1	5.41	30.7
256	36 to 48	7.93	43.8	12	4.82	22.94

Field 6 (CR0806)

SOIL TEST RESULTS
FIELD NAME: CRIT08-06

Sample Number	Depth (Inches)	pH (Sat.Paste)	Saturation Percent	ECe (dS/m)	SAR Extract	SAR:Ece RATIO	Percent Moisture by Wt.
83-1	0 to 12	7.86	35.2	4.01	0.456	0.1	15.52
83-2	12 to 24	7.83	36.9	2.77	8.37	3.0	21.67
83-3	24 to 36	8.01	29.4	4.53	5.92	1.3	13.32
83-4	36 to 48	8.19	34.5	1.18	2.63	2.2	5.74
107-1	0 to 12	7.83	44.6	1.49	1.59	1.1	14.95
107-2	12 to 24	8	43.5	7.93	1.17	0.1	17.14
107-3	24 to 36	7.86	44.8	3.02	5.72	1.9	16.45
107-4	36 to 48	8.66	35.9	0.927	0.925	1.0	3.47
181-1	0 to 12	7.91	47.3	1.55	5.21	3.4	19.9
181-2	12 to 24	8.37	51.5	1.07	1.38	1.3	22.49
181-3	24 to 36	8.76	42.3	5.23	8.81	1.7	17.03
181-4	36 to 48	8.92	32.5	1.75	5.32	3.0	14.63
289-1	0 to 12	7.84	31.4	1.24	1.55	1.3	7.63
289-2	12 to 24	8.42	34.7	0.157	1.32	8.4	4.17
289-3	24 to 36	8.59	37.8	0.0977	1.12	11.5	5.18
289-4	36 to 48	8.36	36.2	0.167	1.04	6.2	4.88
317-1	0 to 12	7.86	41.7	5.22	3.44	0.7	19.15
317-2	12 to 24	7.85	46.2	9.85	7.11	0.7	24.52
317-3	24 to 36	7.83	54.4	12	9.24	0.8	29.11
317-4	36 to 48	7.75	38.6	10.3	8.23	0.8	26.8
408-1	0 to 12	7.84	42.1	0.993	2.08	2.1	15.27
408-2	12 to 24	8.07	35	1.49	2.48	1.7	11.24
408-3	24 to 36	8.45	34.3	0.65	1.84	2.8	4.71
408-4	36 to 48	8.97	39.7	0.0822	1.26	15.3	3.51

Field 7 (CR0807)

SOIL TEST RESULTS
FIELD NAME: CRIT08-07

Sample Number	Depth (Inches)	pH (Sat.Paste)	Saturation Percent	ECe (dS/m)	SAR Extract	SAR:Ece Ratio	Percent Moisture by Wt.
46-1	0 to 24	7.54	66	23.5	36.3	1.5	26.84
46-2	24 to 48	7.79	52.8	10.7	14.2	1.3	27.27
90-1	0 to 24	7.16	48.3	78.5	100	1.3	25.1
90-2	24 to 48	7.58	77.1	11.8	32.2	2.7	25.2
104-1	0 to 24	7.26	49	35.7	17.7	0.5	24.06
104-2	24 to 48	7.19	49.5	31.8	19.9	0.6	24.86
171-1	0 to 24	7.95	31.9	7.44	6.86	0.9	26.2
171-2	24 to 48	8.03	33.5	6.48	7.67	1.2	23.89
197-1	0 to 24	7.68	26.1	10.5	10.2	1.0	24.9
197-2	24 to 48	7.9	26.1	8.07	7.68	1.0	18.89
223-1	0 to 24	7.93	29.6	16.7	14	0.8	22.18
223-2	24 to 48	8.01	28.1	10.2	8.01	0.8	23.82

Field 9 (CR0809)

SOIL TEST RESULTS
FIELD NAME: CRIT08-09

Sample Number	Depth (Inches)	pH (Sat.Paste)	Saturation Percent	ECe (dS/m)	SAR Extract	Percent Moisture by Wt.
110-1	0 to 12	7.85	49.7	2.26	13.3	13.49
110-2	12 to 24	8.01	54.6	1.57	2.02	19.17
110-3	24 to 36	8.21	51.2	3.5	0.474	27.78
110-4	36 to 48	8.16	31.4	3.48	0.921	16.36
161-1	0 to 12	7.8	48.5	1.12	3.04	15.71
161-2	12 to 24	8.19	34	0.47	0.561	4.18
161-3	24 to 36	8.36	31.1	0.578	1.09	11.81
161-4	36 to 48	8.4	32.4	0.592	0.674	12.36
260-1	0 to 12	7.63	51	1.57	2.97	14.89
260-2	12 to 24	7.84	35	1.49	3.53	21.15
260-3	24 to 36	8.14	31.4	1.05	3.01	20.94
260-4	36 to 48	8.05	33	1.02	1.62	21.13
319-1	0 to 12	7.87	50.5	1.06	0.384	17.25
319-2	12 to 24	7.79	51.2	1.24	1.45	24.08
319-3	24 to 36	7.92	27.4	1.5	3.2	6.51
319-4	36 to 48	8.51	28.5	0.383	0.151	4.94
351-1	0 to 12	7.79	29.1	1.39	18.2	7.98
351-2	12 to 24	8.61	29.4	0.137	0.446	5.79
351-3	24 to 36	8.23	31.8	0.494	1.81	12.99
351-4	36 to 48	8.13	31.9	0.827	3.04	22.3
395-1	0 to 12	7.85	39.7	1.59	5.06	17.69
395-2	12 to 24	8.02	33	1.77	6.56	19.59
395-3	24 to 36	7.9	32.4	2.18	3.17	18.49
395-4	36 to 48	8.11	31.4	1.65	2.18	17.51

Field 14 (CR08014)

SOIL TEST RESULTS
FIELD NAME: CRIT08-14

Sample Number	Depth (Inches)	pH (Sat.Paste)	Saturation Percent	ECe (dS/m)	SAR Extract	SAR:Ece RATIO	Percent Moisture by Wt.
121-1	0 to 12	8.14	46.9	1.14	0.574	0.5	13.04
121-2	12 to 24	8.22	51.2	1.62	1.23	0.8	20.47
121-3	24 to 36	8.26	35.3	1.7	1.35	0.8	21.65
121-4	36 to 48	8.2	32.7	1.11	1.47	1.3	15.32
247-1	0 to 12	7.82	44	2.92	2.04	0.7	11.09
247-2	12 to 24	8.14	52.8	2.82	1.9	0.7	19.71
247-3	24 to 36	7.19	37.6	5.49	2.01	0.4	22.48
247-4	36 to 48	7.67	45.5	5.24	2.02	0.4	25.15
277-1	0 to 12	8.1	48.5	1.64	1.14	0.7	11.69
277-2	12 to 24	7.96	60.8	3.32	1.57	0.5	20.07
277-3	24 to 36	7.89	54.9	4.95	1.7	0.3	20.84
277-4	36 to 48	7.9	34	4.26	2.17	0.5	22.64
295-1	0 to 12	8.1	56	1.1	1.6	1.5	14.37
295-2	12 to 24	8.12	39.7	1.22	1.67	1.4	21.8
295-3	24 to 36	8.09	31	1.24	1.95	1.6	10.25
295-4	36 to 48	8.31	33.3	0.798	1.76	2.2	13.59
394-1	0 to 12	8.26	46	1.15	1.14	1.0	13.42
394-2	12 to 24	8.11	37.1	1.64	1.59	1.0	20.38
394-3	24 to 36	8.09	33.7	2.65	1.73	0.7	17.79
394-4	36 to 48	8.01	34.8	3.3	1.75	0.5	22.01
432-1	0 to 12	8.02	33.8	1.08	1.64	1.5	5.29
432-2	12 to 24	8.59	32.7	0.112	1.58	14.1	1.87
432-3	24 to 36	8.4	31	0.619	1.81	2.9	4.52
432-4	36 to 48	8.36	35.3	0.533	2.07	3.9	10.41

Field 15 (CR08015)

SOIL TEST RESULTS
SITE: CRIT08-15

Sample Number	Depth (Inches)	pH (Sat.Paste)	Saturation Percent	ECe (dS/m)	SAR Extract	SAR:ECe Ratio	Percent Moisture by Wt.
3	0 to 12	7.92	59.2	46.7	22.8	0.5	17.58
3	12 to 24	7.91	53.3	54.9	21.5	0.4	22.92
3	24 to 36	7.97	56	42.1	18.9	0.4	21.02
3	36 to 48	8	66	29.6	16.2	0.5	22.33
61	0 to 12	7.99	50	21.9	34.9	1.6	22.26
61	12 to 24	7.8	39.3	53.7	23.9	0.4	24.74
61	24 to 36	7.87	46	52	19.1	0.4	24.95
61	36 to 48	7.91	59.6	34	16.6	0.5	26.67
119	0 to 12	7.77	55.5	2.83	17.6	6.2	16.78
119	12 to 24	8.01	34.7	5.09	30.4	6.0	14.12
119	24 to 36	8.18	35.7	13	43.8	3.4	12.65
119	36 to 48	7.95	71.9	10.6	18.9	1.8	20.67
176	0 to 12	8.09	56.3	14.3	24.5	1.7	11.98
176	12 to 24	8.1	51.7	24.8	26	1.0	24.2
176	24 to 36	7.91	32.9	35.8	21.3	0.6	23.13
176	36 to 48	8.19	52	34.2	21.4	0.6	22.71
239	0 to 12	7.73	60.2	4.33	19.6	4.5	13.85
239	12 to 24	7.86	52	5.84	32	5.5	17.05
239	24 to 36	8.81	35.3	4.4	71.6	16.3	10.42
239	36 to 48	8.09	75.1	5.94	12.4	2.1	22.2
297	0 to 12	8	42.7	20	30.5	1.5	15.32
297	12 to 24	7.98	35.7	20.2	37.9	1.9	14.11
297	24 to 36	7.88	36.2	33.5	38.8	1.2	19.93
297	36 to 48	8.06	74.3	20.4	17.5	0.9	23.84

Field 16 (CR08016)

SOIL TEST RESULTS
FIELD NAME: CRIT08-16

Sample Number	Depth (Inches)	pH (Sat.Paste)	Saturation Percent	ECe (dS/m)	SAR Extract	SAR:Ece RATIO	Percent Moisture by Wt.
27-1	0 to 12	7.58	62.4	12.6	4.28	0.3	20.58
27-2	12 to 24	7.67	44.8	22.1	7.49	0.3	21.22
27-3	24 to 36	7.57	33.7	33.2	12.7	0.4	24.19
27-4	36 to 48	7.83	60.8	26.4	13.5	0.5	19.59
75-1	0 to 12	7.92	44.6	3.62	4.4	1.2	12.83
75-2	12 to 24	7.82	31.8	11.2	5.07	0.5	16.12
75-3	24 to 36	7.99	34.2	19.3	7.86	0.4	21.3
75-4	36 to 48	8	74.3	17.1	12.7	0.7	18.51
385-1	0 to 12	7.61	51.2	1.76	1.26	0.7	13.49
385-2	12 to 24	7.68	42.5	1.79	1.54	0.9	20.39
385-3	24 to 36	7.77	35	3.12	1.37	0.4	26.06
385-4	36 to 48	7.79	70.4	4.64	1.25	0.3	19.28
522-1	0 to 12	7.87	67.4	1.29	1.62	1.3	17.12
522-2	12 to 24	7.96	40.3	2.11	1.37	0.6	19.03
522-3	24 to 36	7.86	36.7	2.29	2.09	0.9	21.9
522-4	36 to 48	7.86	63.7	1.58	6.35	4.0	16.52
624-1	0 to 12	7.88	53.6	1.63	0.676	0.4	14.91
624-2	12 to 24	7.74	62.7	5.02	0.561	0.1	20.4
624-3	24 to 36	7.75	66	9.06	0.437	0.0	17.64
624-4	36 to 48	7.79	55.2	12.5	0.341	0.0	17.51
804-1	0 to 12	8.19	64.7	4.61	0.556	0.1	11.5
804-2	12 to 24	8.34	53	9.67	0.413	0.0	18.62
804-3	24 to 36	8.41	57.8	3.43	0.621	0.2	18.75
804-4	36 to 48	8.46	54.4	12.9	0.38	0.0	16.99

Field 17 (CR08017)

SOIL TEST RESULTS
FIELD NAME: CRIT08-17

Sample Number	Depth (Inches)	pH (Sat.Paste)	Saturation Percent	ECe (dS/m)	SAR Extract	SAR:ECe Ratio	Percent Moisture by Wt.
24-1	0 to 12	7.83	48.5	40.4	54.9	1.4	19.3
24-2	12 to 24	7.87	55.8	30.8	33.9	1.1	20.49
24-3	24 to 36	7.91	62.7	27.3	31.4	1.2	23.24
24-4	36 to 48	7.77	52.2	31.8	35.1	1.1	25.83
44-1	0 to 12	7.55	42.7	10	41.1	4.1	15.94
44-2	12 to 24	7.84	42.1	10.6	29.8	2.8	19.1
44-3	24 to 36	8.04	70.4	17.7	37.2	2.1	23.62
44-4	36 to 48	7.92	66.7	19.8	24.9	1.3	26.52
162-1	0 to 12	8.05	41.3	4.75	7.97	1.7	14.53
162-2	12 to 24	8.27	42.9	9.41	43.2	4.6	21.02
162-3	24 to 36	8.14	41.1	0.817	5.45	6.7	26.07
162-4	36 to 48	8.06	31.9	3.07	10.1	3.3	28.14
194-1	0 to 12	7.75	56.6	1.42	6.34	4.5	17.46
194-2	12 to 24	7.83	38.8	3.38	6.88	2.0	21.09
194-3	24 to 36	7.83	51.2	4.67	10.9	2.3	28.66
194-4	36 to 48	7.88	65	4.1	11.7	2.9	26.92
368-1	0 to 12	7.78	44.2	1.57	2.81	1.8	13.99
368-2	12 to 24	7.79	38	6.52	7.57	1.2	14.2
368-3	24 to 36	7.64	56	7.95	8.07	1.0	17.44
368-4	36 to 48	7.77	70.7	6.51	18.2	2.8	17.41
429-1	0 to 12	7.87	43.5	1.91	4.26	2.2	13.21
429-2	12 to 24	8.14	50	1.41	6.09	4.3	9.82
429-3	24 to 36	7.95	48.5	4.11	7.18	1.7	13.54
429-4	36 to 48	7.87	52	5.09	8.31	1.6	14.57

Field 18a (CR08018a)

SOIL TEST RESULTS
FIELD NAME: CRIT08-18a

Sample Number	Depth (Inches)	pH (Sat.Paste)	Saturation Percent	ECe (dS/m)	SAR Extract	SAR:Ece RATIO	Percent Moisture by Wt.
27-1	0 to 12	7.66	35	1.97	2.42	1.2	14.85
27-2	12 to 24	8.01	32.4	1.51	1.92	1.3	13.33
27-3	24 to 36	8.15	33.2	24.8	0.393	0.0	10.34
27-4	36 to 48	8.38	30.1	0.145	1.99	13.7	5.82
129-1	0 to 12	7.71	36.4	1.17	1.23	1.1	12.98
129-2	12 to 24	8.03	28.9	1.22	1.4	1.1	12.22
129-3	24 to 36	8.15	32.5	0.343	1.91	5.6	11.53
129-4	36 to 48	8.07	31.3	0.483	1.42	2.9	9.64
221-1	0 to 12	7.62	42.9	1.17	2.74	2.3	17.15
221-2	12 to 24	7.92	53.6	1.67	2.76	1.7	22.94
221-3	24 to 36	7.71	61.1	3.7	1.84	0.5	29.89
221-4	36 to 48	7.9	49.2	4.82	3.45	0.7	29.39
287-1	0 to 12	7.89	38.8	1.7	1.62	1.0	15.75
287-2	12 to 24	7.84	36.9	2.15	2.58	1.2	18.72
287-3	24 to 36	7.83	36.2	3.29	3.08	0.9	22.08
287-4	36 to 48	7.7	40.9	3.48	3.21	0.9	25.18
450-1	0 to 12	7.78	48.3	1.25	3	2.4	18.04
450-2	12 to 24	8.13	33.5	2.67	2.75	1.0	14.52
450-3	24 to 36	8.24	40.1	0.478	3.17	6.6	9.28
450-4	36 to 48	8.13	39.9	1.03	3.65	3.5	19.14
577-1	0 to 12	7.56	50	1.26	4.8	3.8	13.6
577-2	12 to 24	7.8	44.8	0.948	4.14	4.4	17.46
577-3	24 to 36	7.82	45.1	1.8	2.67	1.5	24.57
577-4	36 to 48	7.8	32.9	2.15	3.15	1.5	25.4

Field 18b (CR08018b)

SOIL TEST RESULTS
FIELD NAME: CRIT08-18b

Sample Number	Depth (Inches)	pH (Sat.Paste)	Saturation Percent	ECe (dS/m)	SAR Extract	SAR:Ece RATIO	Percent Moisture by Wt.
29-1	0 to 12	7.93	38.2	1.47	1.71	1.2	15.59
29-2	12 to 24	8.23	33	1.81	1.28	0.7	15.6
29-3	24 to 36	8.34	34.7	0.279	2.4	8.6	8.41
29-4	36 to 48	8.65	34.8	0.0811	1.21	14.9	4.58
133-1	0 to 12	8.03	34.8	1.54	2.03	1.3	15.38
133-2	12 to 24	8.4	40.7	1.36	2.34	1.7	22.88
133-3	24 to 36	8.29	50	1.27	2.8	2.2	25.74
133-4	36 to 48	8.28	35.2	1.75	1.63	0.9	26.49
239-1	0 to 12	7.91	49.2	0.966	1.75	1.8	13.74
239-2	12 to 24	8.17	53.8	1.43	2.07	1.4	23.68
239-3	24 to 36	8.26	43.5	1.73	2.96	1.7	23.03
239-4	36 to 48	8.19	35.5	1.69	2.68	1.6	27.7
366-1	0 to 12	7.83	45.5	1.58	3.05	1.9	15.9
366-2	12 to 24	8.14	43.5	3.13	3.03	1.0	24.61
366-3	24 to 36	8.04	63	3.75	3.16	0.8	25.94
366-4	36 to 48	8.06	59.9	5.55	4.27	0.8	26.91
377-1	0 to 12	8.08	41.5	1.17	1.61	1.4	14.17
377-2	12 to 24	8.22	42.7	1.18	1.62	1.4	17.85
377-3	24 to 36	8.78	34.7	0.491	2.76	5.6	11.07
377-4	36 to 48	8.97	37.3	0.42	4.8	11.4	17.13
431-1	0 to 12	8.16	37.8	1.86	2.53	1.4	15.26
431-2	12 to 24	7.96	53.3	3.24	2.53	0.8	24.17
431-3	24 to 36	7.88	41.9	4.54	2.63	0.6	24.96
431-4	36 to 48	7.82	39.7	3.7	4.25	1.1	30.03

Field 19a (CR08019a)

SOIL TEST RESULTS
SITE: CRIT0819a

Sample Number	Depth (Inches)	pH (Sat.Paste)	Saturation Percent	ECe (dS/m)	SAR Extract	Percent Moisture by Wt.
24-1	0 to 12	7.61	39.5	2.02	4.84	15.94
24-2	12 to 24	7.78	42.5	1.18	3.56	23.62
24-3	24 to 36	7.67	39.1	1.62	3.62	30.11
24-4	36 to 48	7.68	51	1.98	1.85	30.35
94-1	0 to 12	7.6	50.5	6.77	8.37	16.95
94-2	12 to 24	7.66	32.7	5.03	7.19	20.75
94-3	24 to 36	7.78	41.3	3.56	6.05	25.65
94-4	36 to 48	7.7	40.1	1.92	3.21	30.17
168-1	0 to 12	7.81	52.2	1.52	3.61	18.09
168-2	12 to 24	7.71	65.4	2.92	6.8	26.11
168-3	24 to 36	7.62	61.1	3.46	7.9	25.33
168-4	36 to 48	7.62	60.2	3.31	7.3	30.84
258-1	0 to 12	7.77	44.6	0.988	6.46	14.03
258-2	12 to 24	7.9	44.2	2.14	7.52	23.65
258-3	24 to 36	8.12	34.5	1.81	7.33	14.08
258-4	36 to 48	8.1	35.5	1.77	6.14	13.33
445-1	0 to 12	7.57	41.1	1.02	2.96	12.64
445-2	12 to 24	7.84	32.5	1.95	9.81	17.48
445-3	24 to 36	7.87	32.5	2.13	16.5	23.87
445-4	36 to 48	7.79	52.2	1.53	10.2	28.21
533-1	0 to 12	7.69	46	0.746	2.95	12.05
533-2	12 to 24	7.88	44	0.796	6.46	12.61
533-3	24 to 36	7.95	33.5	0.835	7.64	13.02
533-4	36 to 48	8.22	26.6	0.816	6.68	7.87

Field 19b (CR08019b)

SOIL TEST RESULTS
SITE: CRIT0819b

Sample Number	Depth (Inches)	pH (Sat.Paste)	Saturation Percent	ECe (dS/m)	SAR Extract	Percent Moisture by Wt.
24	0 to 12	7.63	42.3	2.02	10.6	16.94
24	12 to 24	7.76	42.3	1.75	2.38	19.46
24	24 to 36	7.84	31.6	2.24	2.68	25.51
24	36 to 48	7.8	30.4	2.47	1.9	26.22
125	0 to 12	7.68	39.5	1.92	3.27	13.96
125	12 to 24	7.83	37.1	2.16	3.69	17.72
125	24 to 36	8.35	27.4	0.696	2.7	5.15
125	36 to 48	8.61	28.5	0.267	0.221	3.57
147	0 to 12	7.7	43.8	1.67	0.651	13.03
147	12 to 24	7.73	36.9	3.24	1.21	22.3
147	24 to 36	7.73	32.5	4.65	1.21	26.4
147	36 to 48	7.82	32.2	3.66	0.929	21.71
242	0 to 12	7.53	39.3	2.82	2.09	15.47
242	12 to 24	7.76	34.5	2.22	1.18	19.33
242	24 to 36	7.75	36.4	1.94	1.37	25
242	36 to 48	7.34	48.5	2.55	0.305	26.42
268	0 to 12	7.95	36.9	2.97	21.6	12.12
268	12 to 24	7.95	35	6.77	19.4	21.65
268	24 to 36	7.9	35	5.62	39.7	28.89
268	36 to 48	7.81	37.1	7.14	43.3	30.78
408	0 to 12	7.84	36.2	1.54	4.19	11.73
408	12 to 24	8.16	27.1	1.31	4.52	8.89
408	24 to 36	8.44	32.5	0.545	4.69	7.11
408	36 to 48	8.4	33.5	0.446	5.08	11.5