

MINIMIZING THE NUMBER OF COLLECTORS TO MEASURE UNIFORMITY  
FROM CENTER PIVOT SYSTEMS

by

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## **Abstract**

This report presents the methods to determine the minimum number of collectors to accurately measure the coefficient of uniformity and the average depth of applied water from fixed plate and moving plate center pivot sprinkler irrigation systems. This research conducted an uniformity analysis and an average depth analysis. In the uniformity analysis, catch can collected data from center pivot system tests were divided into base sets of 60 data points. Each base set was further divided into subsets of 30 data points each. T-tests were used to compare the CU values from the base data sets with CU values from each of the subsets.

In the average depth analysis, center pivot system catch can data were divided into base sets with 20 data points. Each base data set was divided into 19 subsets. The 1<sup>st</sup> subset was generated by removing an exterior data point from the base set which was identified by number 1. The 2<sup>nd</sup> subset was generated by removing other exterior data point (identified by number 20) from the previously generated subset (1<sup>st</sup> subset). In this manner, a total of 19 subsets for each base set were generated by removing an exterior point from each previous subset. The percent difference (change) in average depth of each subset from the value of the average depth of the base set was calculated. The percent difference in average depth was then plotted against the associated number of collectors. Both analyses documented that a decrease in the number of collectors from the original density of collectors is acceptable to determine the uniformity and averaged depth of applied water from center pivot spans. Results from the uniformity analysis

demonstrated that 20 collectors were as effective as 60 collectors to quantify the uniformity of a system. The depth analysis showed that 9 to 12 collectors may be needed to measure the average depth of a system (or a portion of a system) to within 5% to 7.5% of the true value.

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## **CHAPTER 1 - Introduction**

Irrigation is the application of water to crops and soils for the purpose of either growing crops with enhanced crop yield or to apply wastewater resources to bioremediation sites. Such areas are typically irrigated to maintain a favorable soil-water balance to optimize plant growth and development.

Center pivot systems started to become a popular method of irrigation in the late 1950's (Ing and Heermann, 1978). Currently, over half of the irrigation systems on the High Plains of the US are center pivot irrigation systems. The rise in labor charges, the decrease in the availability of labor, the need for irrigation systems to operate in uneven terrain and irrigate large areas of land gave way to automated center pivot irrigation systems (Bittinger and Longenbaugh, 1962; Heermann and Hein, 1968). Center pivot irrigation systems can be automated, reduces labor, and give high application uniformities (Hanson and Orloff, 1996). Center pivot systems also became popular on the sandy soils of southwestern Kansas because of their ability to apply water to large areas with high application rates (Kincaid et al., 1969; Heermann and Swedensky, 1984).

Declining ground water levels and a need for high uniformity application devices on irrigation systems gave rise to new sprinklers and methods to apply water (Buchleiter, 1992). Typical sprinklers that are currently used include fixed plate, moving plate and impact sprinklers. One type of fixed plate sprinkler consists of one or more fixed plates with grooves and produces water stream patterns like spokes on a bike wheel which may reduce pattern distortion & drift losses due to wind. A type of moving plate sprinkler

consists of one or more moving rotating plates that produce a rain like pattern. These type of sprinklers can operate at pressures as low as 69 to 138 kPa (Hanson and Orloff, 1996). Also, Hanson and Orloff et al. (1996) reported that wind may increase the uniformity of fixed plate sprinklers and decrease the uniformity of rotators (moving plate) under the same windy conditions. High pressure sprinklers (300 to 600 kPa) produce well broken up droplet patterns and result in a uniform distribution of water (Bilanski and Kidder, 1958).

However, the operating cost associated with higher pressure sprinklers is greater than for lower pressure sprinklers and evaporation losses can be higher due to the smaller droplets. Ali and Barefoot (1981) reported 48% evaporation losses from a single impact sprinkler under high wind conditions. Kohl (1987) reported that evaporation losses were only 1.5% when smooth and coarse spray plate sprinklers were operated at 100 kPa. Thomson et al. (1997) reported 13% and 5% evaporation losses for impact and spray sprinkler irrigation systems. The modifications (addition of auxiliary sprinklers along the center pivot lateral line which operate when the end gun sprinkler was turned off) in old and new irrigation systems to reduce energy consumption would improve the energy efficiency of the system and decrease overall costs (Allen and Brockway, 1984).

Although Gilley et al. (1980) and James et al. (1982) reported that low pressure sprinkler irrigation systems require less energy than the high pressure sprinkler systems, low pressure, generally increases the high application rate of the system may cause runoff, soil erosion and non-uniformity (James and Blair, 1984; Howell and Phene, 1983). Edling (1985) reported that low pressure sprinklers would cause non-uniformity but runoff would not be so high. Vories and Von Bernuth (1986) reported that low pressure

sprinklers may also reduce yield due to deep percolation of nutrients into soil and leaving plants vulnerable to diseases.

James and Blair (1983), and Hanson and Orloff (1996) reported that fixed plate sprinklers contain grooves which produce distinct water stream like patterns and that are more resistance to being carried away by the wind. Moving plate sprinklers produce distinct droplets like rain with high uniformity distribution but are more susceptible to drift.

Lamm et al. (1994) reported that under limited irrigation crop yield response to evapotranspiration is linear. Von Bernuth (1983) also reported that field locations receiving less water due to non-uniform irrigation will yield less. An increase in uniformity by 5-12% will increase the yield of a corn crop by 3-17% under fully irrigated conditions (Bralts et al. 1994). Crop growth and yield uniformity can be decreased by widely spaced sprinklers on a center pivot irrigation span (figure 1) and cause reduced yield of the crop.





**Figure 1.** The uneven growth of a corn crop due to non-uniformity caused by widely spaced sprinklers. (photo courtesy of D. Rogers; Department of Biological and Agricultural Engineering, KSU, Manhattan, Kansas).

Sprinkler irrigation system uniformity is a measure of the distribution of variable water depths over an irrigated field. It is a very important characteristic of the irrigation system which characterizes the effectiveness of the system. Christiansen (1942) noticed uniformity importance and documented major factors which affect the uniformity. Christiansen (1942) developed a coefficient of uniformity (CU) that has been widely used for the evaluation of the uniformity of sprinkler systems. Because the area of influence of each sprinkler on a center pivot system increases with the radial distance from the pivot point, Heermann and Hein (1968) modified the Christiansen (1942) CU equation to account for the increase in area of influence. Ayars et al. (1991) reported that measurement of system uniformity only one time under the prevailing climatic conditions would not represent a true uniformity test. Branscheid and Hart (1968) reported that the uniformity test should be conducted in a well conditioned environment which is very close to outside real conditions. Fukui et al. (1980) reported that wind speeds less than 1 m/s had no effect on sprinkler uniformity. James and Blair (1984) also reported that wind velocity of 4 m/s had no effect on the center pivot sprinkler irrigation system uniformity. Heermann et al. (1999) reported that for low pressure sprinklers, the spacing from sprinkler to sprinkler should not exceed the radius of the throw if a high coefficient of uniformity to be maintained.

Kohl (1972) reported that the accuracy of the collectors used in measuring the depth of irrigation and rainfall is unknown. The collectors used in measuring uniformity of sprinkler irrigation systems have included plastic pans, fuel funnels (Clark and Finley, 1975), oil cans (Heermann and Kohl, 1980), quart cans (Nir et al., 1980), and coffee cans on stakes (Vlotman and Fangmeier, 1983). Marek et al. (1985) reported that catch devices should have features to prevent splashing of water in and out and should also minimize the evaporation losses. Collectors should also have sharp edges to separate the water droplets.

The ASAE, 2001 standard S436.1 describes the uniformity test procedure for center pivot and linear move irrigation machines. It states that the diameter of the collector opening should be at least 60 mm and 0.5- 1 time of the height of the collector. The collector should minimize the loss of water due to evaporation (light color material) and splashing (sharp edges to separate the water drop lets) and should be at least 120 mm in height. Collector material should be economical and should not hold water droplets inside wall of the collector. Two or more sets of collectors should be arranged parallel to one another on center pivot irrigation systems to collect data from spray type sprinklers (figure 2).

Collectors used in a uniformity test represent a small fraction of the total irrigated area. Depending on the speed of the wind, and the design and position of the collector, applied water may be blown away from collectors (Livingston et al., 1985). Evaporation losses from certain collectors can be substantial as well. Addressing the above problems such as evaporation of collected water, Clark et al. (2004) constructed a cost effective, non-evaporative, easy to construct and use catch device called the IrriGage. The IrriGage

collector was made with a PVC pipe barrel and a PVC cap glued to the bottom of the barrel. A plastic graduated bottle was attached to the PVC cap to collect the water through a drain hole from the barrel. This bottle acts as the reservoir and reduces losses due to evaporation. The length and the diameter of the IrriGage are 200 mm and 100 mm, respectively. This catch device was tested for rainfall and the evaluation of the sprinklers on linear move and center pivot irrigation systems. It was reported that the unique storage bottle feature on the IrriGage which made it non-evaporating also permitted collected water in the bottles to be measured at a convenient time. The IrriGage collectors exceeded the ASAE, 2001 standard criteria for the catch devices (Clark et al., 2004). Clark et al. (2003) reported that the use of the IrriGage for collecting water from coarse-grooved fixed-plate sprinklers may result in higher or lower depth of measured water due to the discrete streams of water coming from these sprinklers. It was also reported that even when using large PANS measured depth variations of 50-150% were measured for adjacently situated pans under coarse-grooved sprinklers. Thus, several collectors are needed to accurately measure the average application depth. PANS were made black plastic material with an opening diameter of 430 mm and 117 mm deep.

Clark et al. (2003) conducted laboratory studies to simulate water application from a linear move sprinkler system. Three different nozzles with, grooved diffusers, and regulators were tested at selected orifice sizes and pressure combinations. The measured single sprinkler results were used for computer simulation of various sprinkler spacings. Single fixed-plate sprinkler water application patterns were overlapped for (for different orifice size and pressure combination) simulating a linear moving sprinkler system. The CU values calculated from the simulations agreed with field studies conducted in south

central Kansas on a linear-move and three center pivot systems. The following points have been suggested by the authors from this research.

- 1) Fixed-plate sprinklers operated at the higher end of the manufacturer recommended spacing range and lower end of the recommended pressure range may give CU values much less than 90.
- 2) Sprinkler to sprinkler spacing of 20% to 25% of wetted diameter should not be exceeded (for fixed plate sprinklers) if higher CU values (>90) are expected.
- 3) Fixed plate spray sprinklers may be spaced at spacings of 2.5 to 3.0 m when operated at higher pressures, but evaporative and drift losses are greater. This reduces the application efficiency.

Clark et al. (2006) compared the performance of IrriGage collectors with PAN collectors and a similar collector to the IrriGage in field studies that were conducted in 1999, 2000, and 2002. In 1999, the IrriGage collectors recorded reduced water depths than the PAN collectors when IrriGages were positioned 1-2 m above ground level within a corn canopy and PAN collectors were positioned in a grass buffer. The difference in measured depths between IrriGages and PAN collectors was believed to be due to different positions of the collectors. During 2000 study, IrriGages were moved to the open grass buffer and were lowered to 600 mm above the ground and PAN collectors remained at the same position as in 1999. In the 2000 arrangement, IrriGages recorded greater depths than the PAN collectors. Also, the water depths collected under fixed-plate sprinklers were found to have less variance with the PAN collectors than the IrriGages. In 2002, IrriGages measured greater irrigation depths and variances than 150 mm diameter

collectors. Also, IrriGages did not accurately measure the irrigation depths from the fixed-plate sprinklers when compared to 150 mm collectors.

The pattern distribution and measured depths under spinning and wobbling plate sprinkler packages with IrriGages compared well with those of the 150 mm collectors. From the results obtained during the years 1999, 2000, and 2002, the authors believed that for measuring uniformity under fixed-plate sprinkler packages, collectors may need a collector opening that is greater than 100 mm diameter. The authors also suggested that ASAE standard (ASAE S436.1, 2001) which suggests a minimum of 60 mm for the collector opening, should be revised for low pressure sprinkler systems.



**Figure 2.** Arrangement of Pan and IrriGage collectors in a uniformity test. (photo courtesy D. Rogers, Department of Biological and Agricultural Engineering, KSU, Manhattan, Kansas)

Conducting a center pivot system uniformity test can be a laborious process requiring multiple people for set up and data collection. The cost of the material to make IrriGages and support stakes can also be high for a full system evaluation that may use 150 or more collectors. However, if the area of interest is just a portion of the full system (such as a single span), parts and labor requirements can be reduced. This can lead to simpler procedures for conducting these tests and perhaps increased use of uniformity tests. As farmers and system operators know and learn more about their irrigation systems, they will become better system managers. This may in turn result in increased water use efficiency and reduced water use.

The predominant method of irrigation in the state of Kansas is with center pivot irrigation systems. Center pivot irrigation system uniformity tests were conducted during 1998 to 2005 in several counties of south central and southwestern Kansas (D. Rogers, personal communication, 2007). Catch data were collected, analyzed, and the coefficient of uniformity (CU) was calculated for each of the systems. Collected and analyzed data were stored in an electronic database in the Department of Biological and Agricultural Engineering at Kansas State University, Manhattan, Kansas. Additional analyses were conducted using these data sets to determine if the coefficient of uniformity and average applied depth of water could be accurately determined using a reduced set of collectors. This analysis included 26 data sets from center pivot systems that included fixed plate and moving plate sprinklers. The details of the center pivot irrigation systems used in the analyses were shown in the table 1.1. Each data set included the depth of collected water and the radius at which the collectors were positioned from the pivot point. The number of collector data points for each of the analyzed systems ranged from 60 to 300 values.

**Table 1.1.** Summary of center pivot irrigation systems used in the analyses.

	System Name/ Code	Sprinkler	Drop Height (ft)	Collector Spacing (ft)	Pressure Regulated	Collector Diameter (in.)	Number of Collectors	Measured Region (ft-ft)	Sprinkler Spacing (ft)	CU	Depth (in.)
1	SD 6-15-05	Rotators	7	6	no	4	123	480 - 1212	NA	85.2	0.94
2	SN 6-02-05	LDN	9	8	Yes	4	85	537 - 1249	10	87	0.89
3	SN 7-18-02	Fixed plate	7	6	no	4	90	750 - 1284	8	50.1	0.67
4	SW 5-15-03	I-Wobs	7	8	Yes	4	117	350 - 1278	10	76.3	1.1
5	SG 3-14-03	Rotators	NA	8	No	4	126	148 - 1284	NA	65.9	0.56
6	SG 5-55-02	Rotators	NA	6	NA	4	181	132 - 1212	NA	83.8	0.58
7	RC 7-06-00	Rotators	NA	10	Yes	4	70	540 - 1230	18	72.8	0.88
8	RP 8-07-02	I - Wob	7	8	Yes	4	107	8 - 848	NA	75.6	0.89
9	RN 6-05-00	Rotators	9	10	NA	4	64	630 - 1260	14	74.5	0.37
10	RN 6-08-02	NA	NA	12	NA	4	95	343 - 1311	NA	65.3	0.89
11	PN 4-01-03	I-Wob	NA	8	Yes	4	40	366 -1302	10	81.9	0.71
12	MP 8-21-02a	Rotators	7.5	8	Yes	4	115	365 - 1277	10	76	0.69
13	MP 8-21-02b	Rotators	8	8	Yes	4	119	0 - 944	.	67	1.16
14	LN 4-03-03	Spray heads	NA	8	Yes	4	130	250 - 1282	10	71	0.56
15	KI 7-8-2002	Rotators	NA	8	NA	4	122	340 - 1308	NA	76.4	0.93
16	HV 4-10-03	Rotators	9	10	No	4	98	383 - 1353	16	62.6	0.72
17	FO 5-16-02	Fixed plate	NA	8	Yes	4	140	210 - 1322	NA	58.2	0.65
18	FI041706a	Accel. & LDNs	NA	4	Yes	4	232	12 - 1294	NA	77.6	1.12
19	FI071905b	Fixed plate	NA	8	Yes	4	177	50 - 1298	10	75.5	1.12
20	FI 4-16-02	Fixed plate	7	8	no	4	160	16 - 1288	NA	81.9	0.84
21	BT 3-27-02	I - Wob	NA	8	NA	4	117	326 - 1254	NA	81.7	0.63
22	FI052306a	Accelerators	NA	6	Yes	4	326	Dec-50	NA		
23	FI060606a	Accelerators	NA	8	Yes	4	177	8 - 1368	NA		
24	FI 5-26-05	Fixed plate	NA	5	Yes	4	.	.	5	72.8	0.96
25	SV 5-12-05	NA	NA	6	NA	4	213	24 - 1296	NA	77.2	0.94
26	FI 6-14-06	Accelerators	NA	8	Yes	4		NA	NA	71.6	0.85

Irrigage collectors (Clark et al., 2004) and PAN collectors were used for the uniformity tests. The Irrigage collectors had a 10 cm (4 in.) diameter opening while the PAN collectors had a 43 cm (17 in.) diameter opening. For this analysis, only the data sets associated with the Irrigage collectors were considered.

The purpose of this research is to conduct additional analyses with these data sets to conduct uniformity tests on center pivot systems with fixed plate and moving plate sprinklers.

The objectives of this study were

- 1) To determine the minimum number of collectors for a uniformity test on fixed plate and moving plate sprinkler irrigation systems.
- 2) To determine the minimum number of collectors that are needed to accurately measure the average depth of applied water from a center pivot system span equipped with low-pressure, fixed and moving plate sprinklers.



## **CHAPTER 2 - Methods and Materials**

### ***Data Analysis 1: Uniformity***

This research used irrigation system collector data sets from 26 center pivot irrigation systems. The collector data were divided into base sets of 60 data points each. The number of base sets for each center pivot system was dependent on the size of the original system data set. For example, if the size of the center pivot irrigation system data set had 125 values, then the data set of that system was divided into two base sets. If the size of the system data set included 300 values, then the data set of the system was divided into five base sets. All data analyses were done in Microsoft Excel.

The irrigation depth data points in the base set were identified by numbers from 1 to 60 (table 2.1). Each base set was then sub-divided into five subsets. These subsets were called A1, A2, B1, B2, and B3. Subsets A1 and A2 each contained 30 data points while subsets B1, B2, and B3 each contained 20 data points. Subset A1 was composed of those data points of the base set which were initially identified by odd numbers (1, 3, 5,....., 59) while subset A2 was composed of those data points which were initially identified by even numbers (2, 4, 6,....., 60). In similar fashion, subset B1 was composed of data points initially identified by numbers 1, 4, 7, 10,....., 58, subset B2 was composed of data points initially identified by numbers 2, 5, 8, 11,....., 59, and subset B3 was composed of data points initially identified by numbers 3, 6, 9, 12,....., 60. This process of division of each irrigation uniformity test data into base sets and subsets was done for all 26

irrigation systems. table 2.1 shows the division of the base data set into subsets for segment I of system Barton BT 3-27-02.

**Table 2.1** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment I of system Barton BT 3-27-02.

Collector No.	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)
1	326	0.58	326	0.58	334	0.51	326	0.58	334	0.51	342	0.73
2	334	0.51	342	0.73	350	0.61	350	0.61	358	0.75	366	0.78
3	342	0.73	358	0.75	366	0.78	374	0.56	382	0.58	390	0.44
4	350	0.61	374	0.56	382	0.58	398	0.58	406	0.49	414	0.51
5	358	0.75	390	0.44	398	0.58	422	0.39	430	0.66	438	0.44
6	366	0.78	406	0.49	414	0.51	446	0.44	454	0.56	462	0.51
7	374	0.56	422	0.39	430	0.66	470	0.49	478	0.44	486	0.49
8	382	0.58	438	0.44	446	0.44	494	0.49	502	0.39	510	0.51
9	390	0.44	454	0.56	462	0.51	518	0.51	526	0.58	534	0.53
10	398	0.58	470	0.49	478	0.44	542	0.44	550	0.51	558	0.49
11	406	0.49	486	0.49	494	0.49	566	0.51	574	0.58	582	0.36
12	414	0.51	502	0.39	510	0.51	590	0.51	598	0.49	606	0.41
13	422	0.39	518	0.51	526	0.58	614	0.58	622	0.58	630	0.44
14	430	0.66	534	0.53	542	0.44	638	0.44	646	0.51	654	0.51
15	438	0.44	550	0.51	558	0.49	662	0.46	670	0.80	678	0.61
16	446	0.44	566	0.51	574	0.58	686	0.85	694	0.46	702	0.51
17	454	0.56	582	0.36	590	0.51	710	0.78	718	0.66	726	0.63
18	462	0.51	598	0.49	606	0.41	734	0.58	742	0.66	734	0.58
19	470	0.49	614	0.58	622	0.58	758	0.51	766	0.63	758	0.51
20	478	0.44	630	0.44	638	0.44	782	0.44	790	0.66	782	0.44
21	486	0.49	646	0.51	654	0.51						
22	494	0.49	662	0.46	670	0.80						
23	502	0.39	678	0.61	686	0.85						
24	510	0.51	694	0.46	702	0.51						
25	518	0.51	710	0.78	718	0.66						
26	526	0.58	726	0.63	734	0.58						
27	534	0.53	742	0.66	750	0.51						
28	542	0.44	758	0.51	766	0.63						
29	550	0.51	774	0.58	782	0.44						
30	558	0.49	790	0.66	798	0.66						
31	566	0.51										
32	574	0.58										
33	582	0.36										
34	590	0.51										
35	598	0.49										
36	606	0.41										
37	614	0.58										
38	622	0.58										
39	630	0.44										
40	638	0.44										
41	646	0.51										
42	654	0.51										
43	662	0.46										
44	670	0.80										
45	678	0.61										
46	686	0.85										
47	694	0.46										
48	702	0.51										
49	710	0.78										
50	718	0.66										
51	726	0.63										
52	734	0.58										
53	742	0.66										
54	750	0.51										
55	758	0.51										
56	766	0.63										
57	774	0.58										
58	782	0.44										
59	790	0.66										
60	798	0.66										

The Coefficient of Uniformity (CU) for each base set and associated subsets was calculated using the Christiansen equation (Christiansen, 1942) and were tabulated. The base sets together with the associated subsets were categorized into “fair”, “good”, and “very good” depending on the value of the CU of that base set. The base set and associated subsets were assigned to the fair category for CU values (of the base sets)  $<0.70$ , good for CU values between 0.70 and 0.85, and very good for CU values (of the base set)  $>0.85$ . A paired sample t-test was performed to compare the set of CU values of the base set with the set of CU values of the associated subsets within each category (fair, good, very good). The level of significance was reported according to the value of probability (p).

### ***Average Depth Analysis 2:***

In the average depth analysis, each irrigation system collector data set was divided into base data sets each containing twenty data points. The data points in each base set were identified by numbers from 1 to 20. Each base set was then divided into 19 subsets. The 1<sup>st</sup> subset was generated by removing an exterior data point from the base set which was identified by the number 1. The 2<sup>nd</sup> subset was generated by removing the opposite exterior data point (identified by the number 20) from the previously generated subset (1<sup>st</sup> subset). The 3<sup>rd</sup> subset was generated by removing the data point identified by the number 2 from the previous subset (2<sup>nd</sup> subset). The base data set of 20 points was divided totally into 19 subsets by this procedure of removing alternating exterior data points from each previous subset. The average depth and CU for each base set and subsets were then calculated.

The Coefficient of Uniformity (CU) for each base set was calculated using the Christiansen equation (Christiansen, 1942). The percentage difference (change) in the average depth of each subset from the average depth of the base set was calculated. A graph was plotted for number of collectors (in each subset) against percent change in average depth (for each subset associated with the base set). The graphs were plotted for all the base sets and the associated subsets in an irrigation system data set and reported. The above process was repeated for all 26 irrigation systems.

From the above results, the minimum number of collectors required for a value of percent change in the average depth of the subsets from the average depth of the base set was tabulated for all the base sets in an irrigation system and for all 26 irrigation systems. The minimum number of collectors needed for percent changes from the base data set 2.5%, 5%, 7.5%, 10%, 12.5%, 15%, 17.5%, and 20% were tabulated for all the 26 of base sets from all the irrigation systems with the corresponding CU value and the average depth of the base set.

A graph was plotted for CU (including all the CU values of all the base sets of all the irrigation systems) against the minimum number of collectors corresponding to each category percent change (2.5%, 5%, 7.5%, 10%, 12.5%, 15% , 17.5%, and 20%). The graphs depicted the minimum number of collectors required to maintain the subset average depth within 2.5% (also, 5%, 7.5%, 10%, 12.5%, 15% , 17.5%, and 20%) of the base data average depth with respect to the CU associated with the base data set.

The above tabulated results were further separated into fixed plate and moving plate systems. Depending on the value of the CU of the base sets, the data was further divided within each category (fixed plate, moving plate) into fair if the CU (of the base

set) $<0.70$ , good for CU (of the base set) values between  $0.70$  and  $0.85$ , very good for CU values(of the base set) $>0.85$ .

## CHAPTER 3 - Results and Discussions

### Uniformity Analysis

The CU values of the base sets (containing 60 data points each) of all 26 center pivot irrigation systems and their associated subsets (containing 30 and 20 data points) are summarized in tables 3.1 and 3.2. The CU values of the base sets ranged from 0.40 to 0.90 (table 3.1). The CU values of the subsets of the base sets ranged from 0.38 to 0.94 (Table 3.2) The CU summaries and t-test comparison results (comparing base set CU values with subset CU values separately) are summarized in figure 3 and table 3.3.

When the whole set of CU values including all categories (Fair, Good, Very Good) of the base set were separately compared to the whole set of CU values of the subsets separately, there were no significant differences among the base set and subsets A1, B1, and B3 (table 3.3). Though, it shows a statistical difference between base set CU values and the subset A2 and B2 CU values, the p values of 0.09 and 0.03 are high enough to believe that there is not a large difference among the base set and those subset (A2 and B2) CU values. When the set of CU values under the Fair category ( $CU < 0.70$ ) of the base sets were compared to that of the subsets, there were no significant differences between the base set and subsets A1, A2, B1, and B3. Though, the statistical difference is significant, the numerical difference between the base set and subset (B2) CU values is small. When the set of CU values under the Good category (CU value between 0.70 and 0.85) of the base sets were compared to that of the subsets, there were no significant differences between the base set and the subsets A1, A2, B1, and B2.

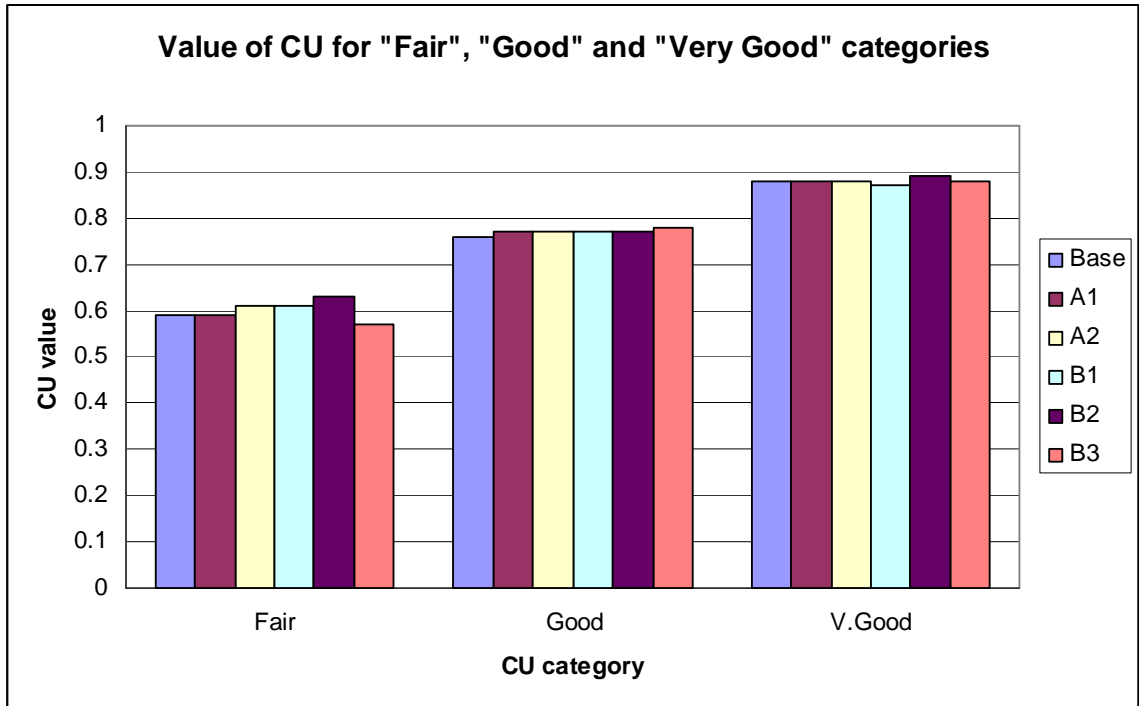
**Table 3.1** Summary of calculated CU values from measured water depths of 60 collector segments (Base data sets) and their subsets (A1, A2, B1, B2, B3) of all 26 irrigation systems(datasets 1-28).

Dataset No.	System Base Set Name/ code	CU and the spacing between the collectors in the divided subsets and the base set											
		Base set		A1		A2		B1		B2		B3	
		Base CU	spacing (ft)	A1 CU	Spacing (ft)	A2 CU	spacing (ft)	B1 CU	spacing (ft)	B2 CU	spacing (ft)	B3 CU	spacing (ft)
1	1- BT 3-27-02	0.84	8	0.85	16	0.84	16	0.83	24	0.86	24	0.87	24
2	2- BT 3-27-02	0.86	8	0.87	16	0.86	16	0.88	24	0.86	24	0.86	24
3	1- FI052306a	0.40	6	0.48	12	0.38	12	0.39	18	0.46	18	0.29	18
4	2-FI052306a	0.67	6	0.61	12	0.75	12	0.77	18	0.67	18	0.62	18
5	3-FI052306a	0.77	6	0.75	12	0.77	12	0.79	18	0.81	18	0.74	18
6	4-FI052306a	0.82	6	0.84	12	0.80	12	0.89	18	0.82	18	0.90	18
7	5-FI052306a	0.79	6	0.73	12	0.86	12	0.88	18	0.74	18	0.80	18
8	1-FI060606a	0.67	8	0.62	16	0.76	16	0.76	24	0.60	24	0.70	24
9	2-FI060606a	0.85	8	0.88	16	0.82	16	0.89	24	0.79	24	0.87	24
10	3-FI060606a	0.72	8	0.72	16	0.71	16	0.60	24	0.75	24	0.84	24
11	1-FI 5-26-05	0.76	5	0.79	10	0.71	10	0.76	15	0.79	15	0.76	15
12	2-FI 5-26-05	0.73	5	0.78	10	0.68	10	0.77	15	0.68	15	0.77	15
13	3-FI 5-26-05	0.73	5	0.70	10	0.75	10	0.74	15	0.79	15	0.67	15
14	4-FI 5-26-05	0.74	5	0.73	10	0.77	10	0.76	15	0.73	15	0.74	15
15	1-FI071905b	0.70	8	0.67	16	0.74	16	0.72	24	0.63	24	0.74	24
16	2-FI071905b	0.78	8	0.83	16	0.73	16	0.76	24	0.81	24	0.74	24
17	1-FI 4-16-02	0.76	8	0.78	16	0.75	16	0.72	24	0.85	24	0.76	24
18	2-FI 4-16-02	0.82	8	0.81	16	0.84	16	0.78	24	0.91	24	0.80	24
19	1-FI 6-14-06	0.78	8	0.81	16	0.75	16	0.88	24	0.70	24	0.90	24
20	2-FI 6-14-06	0.69	8	0.66	16	0.71	16	0.65	24	0.68	24	0.91	24
21	1-FI041706a	0.75	4	0.79	8	0.72	8	0.77	12	0.82	12	0.81	12
22	2-FI041706a	0.78	4	0.74	8	0.82	8	0.80	12	0.75	12	0.78	12
23	3-FI041706a	0.82	4	0.80	8	0.84	8	0.81	12	0.83	12	0.83	12
24	4-FI041706a	0.85	4	0.83	8	0.86	8	0.89	12	0.82	12	0.89	12
25	1- FO 3-13-06	0.74	NA	0.82	NA	0.68	NA	0.70	NA	0.82	NA	0.79	NA
26	2- FO 3-13-06	0.86	NA	0.85	NA	0.88	NA	0.87	NA	0.85	NA	0.86	NA
27	1- FO 5-16-02	0.45	8	0.43	16	0.48	16	0.42	24	0.52	24	0.42	24
28	2- FO 5-16-02	0.72	8	0.72	16	0.73	16	0.72	24	0.74	24	0.70	24

**Table 3.2.** Summary of calculated CU values from measured water depths of 60 collector segments (Base data sets) and their subsets (A1, A2, B1, B2, B3) of all 26 irrigation systems (datasets 29-56).

Dataset No.	System Base Set Name/ code	CU and the spacing between the collectors in the divided subsets and the base set											
		Base set		A1		A2		B1		B2		B3	
		Base CU	spacing (ft)	A1 CU	Spacing (ft)	A2 CU	spacing (ft)	B1 CU	spacing (ft)	B2 CU	spacing (ft)	B3 CU	spacing (ft)
29	1- HV 4-10-03	0.56	10	0.56	20	0.57	20	0.52	30	0.56	30	0.61	30
30	2- KI 7-8-2002	0.77	8	0.80	16	0.73	16	0.74	24	0.72	24	0.79	24
31	1- LN 4-03-03	0.73	8	0.69	16	0.79	16	0.75	24	0.65	24	0.75	24
32	2- LN 4-03-03	0.75	8	0.77	16	0.73	16	0.76	24	0.75	24	0.77	24
33	1- MP 8-21-02	0.71	8	0.77	16	0.67	16	0.77	24	0.69	24	0.68	24
34	1- MP 8-21-02	0.56	8	0.60	16	0.52	16	0.75	24	0.54	24	0.56	24
35	2- MP 8-21-02	0.74	8	0.73	16	0.77	16	0.72	24	0.81	24	0.74	24
36	1- PN 4-01-03	0.88	8	0.93	16	0.83	16	0.86	24	0.86	24	0.92	24
37	2- PN 4-01-03	0.79	8	0.74	16	0.87	16	0.80	24	0.75	24	0.83	24
38	1- RN 6-08-02	0.71	12	0.75	24	0.67	24	0.71	36	0.65	36	0.81	36
39	1- RN 6-05-00	0.76	10	0.73	20	0.79	20	0.75	30	0.75	30	0.68	30
40	1- RP 8-07-02	0.78	8	0.75	16	0.80	16	0.69	24	0.86	24	0.79	24
41	1- RC 7-06-00	0.71	10	0.69	20	0.72	20	0.69	30	0.69	30	0.71	30
42	1-SG 5-55-02	0.72	6	0.74	12	0.70	12	0.82	18	0.65	18	0.75	18
43	2-SG 5-55-02	0.85	6	0.78	12	0.91	12	0.84	18	0.91	18	0.84	18
44	3- SG 5-55-02	0.90	6	0.91	12	0.90	12	0.88	18	0.94	18	0.89	18
45	1- SG 3-14-03	0.65	8	0.66	16	0.66	16	0.69	24	0.72	24	0.61	24
46	2- SG 3-14-03	0.66	8	0.71	16	0.61	16	0.63	24	0.76	24	0.57	24
47	1- SW 5-15-03	0.78	8	0.73	16	0.84	16	0.82	24	0.82	24	0.73	24
48	2- SW 5-15-03	0.77	8	0.75	16	0.80	16	0.77	24	0.76	24	0.79	24
49	1- SN 6-02-05	0.90	8	0.90	16	0.90	16	0.88	24	0.93	24	0.89	24
50	1- SN 7-18-02	0.50	8	0.41	16	0.59	16	0.45	24	0.60	24	0.51	24
51	1- SD 6-15-05	0.74	6	0.75	12	0.73	12	0.89	18	0.72	18	0.61	18
52	2- SD 6-15-05	0.74	6	0.72	12	0.76	12	0.60	18	0.83	18	0.80	18
53	1- SF 6-6-00	0.89		0.85	0	0.92	0	0.87	0	0.92	0	0.87	0
54	1- SV 5-12-05	0.63	6	0.69	12	0.58	12	0.64	18	0.70	18	0.60	18
55	2- SV 5-12-05	0.77	6	0.82	12	0.75	12	0.83	18	0.83	18	0.68	18
56	3- SV 5-12-05	0.82	6	0.82	12	0.82	12	0.77	18	0.84	18	0.84	18





**Figure 3.** Values of CU for the base system and subsets, A1, A2, B1, B2, and B3 under the categories of “Fair”, “Good”, and “Very Good”.

**Table 3.3.** Average CU values from the base data set and the subsets (A1, A2, B1, B2, and B3) for all center pivots (CP) and for those with CU values that were within the Fair, Good, and Very Good categories. T-test results of comparisons between subset data and the base data set are also shown. A single, double, or triple asterisk next to a subset CU value indicates a difference between that subset CU value and the base set CU value at the 0.1, 0.05, or 0.01 levels of significance.

	CU- Values					
	Base	A1	A2	B1	B2	B3
All CP's	0.74	0.74	0.75*	0.75	0.75**	0.75
Fair	0.59	0.59	0.61	0.61	0.63**	0.57
Good	0.76	0.77	0.77	0.77	0.77	0.78*
V.Good	0.88	0.88	0.88	0.87	0.89	0.88
*	p<0.1					
**	p<0.05					
***	p<0.01					

Again, while different, the numerical difference in the CU values between the base data set and set B3 is small.

Similarly, when the set of CU values under the Very Good category ( $CU > 0.85$ ) of base set data were compared to that of the subsets, there was no significant difference between the base set and any of the subsets. From table 3.3, the level of significance from t-test results show that 20 collectors may be used in the uniformity test instead of 60 collectors for all the CU values. This analysis suggests that a decrease in the number of collectors by 67% is acceptable.

Table 3.4 shows the average measured depth values of base sets of all 26 center pivot irrigation systems and their associated subsets. The average values of the subsets of a base set were very close the average value of the associated base set (table 3.4). The t-test comparison results (comparing base set average values with subset average values) in table 3.5 also show that the average depths of each subset are very close to the average depth of the base set.

When the whole set of average values (including all categories (Fair, Good, Very Good) of the Base set) were compared to the whole set of average values of subsets separately, there were no significant differences among the base set and the subsets A1,

A2, B1, B2, and B3. When the set of average values under the Fair category ( $CU < 0.70$ ) of the Base sets were compared to that of the subsets, there was no significant difference between the base set and subsets A1, A2, B2, and B3. There was a significant statistical difference between the base set and the subset B1 (with t-test p value 0.01). However, the numerical difference was small. When the set of CU values under the Good category (CU value between 0.70 and 0.85) of the Base sets were compared to that of the subsets, there

**Table 3.4.** Summary of calculated average depth values from measured water depths of 60 collector segments sections (base data sets) and their subsets (A1, A2, B1, B2, B3) of all 26 irrigation systems.

System		Average Depth (inches)					
No.	System Base Set Name/code	Base	A1	A2	B1	B2	B3
1	1-BT 3-27-02	0.55	0.54	0.56	0.54	0.57	0.52
2	2-BT 3-27-02	0.71	0.69	0.72	0.75	0.68	0.71
3	1-FI052306a	0.92	0.77	1.07	1.16	0.78	0.84
4	2-FI052306a	0.66	0.71	0.61	0.58	0.67	0.73
5	3-FI052306a	0.60	0.61	0.58	0.60	0.57	0.62
6	4-FI052306a	0.66	0.66	0.67	0.62	0.69	0.62
7	5-FI052306a	0.70	0.75	0.65	0.61	0.76	0.70
8	1-FI060606a	1.22	1.32	1.11	1.09	1.42	1.15
9	2-FI060606a	0.99	0.97	1.01	0.95	1.05	0.95
10	3-FI060606a	1.13	1.12	1.13	1.23	1.10	1.09
11	1-FI 5-26-05	0.88	0.85	0.91	0.85	0.82	0.91
12	2-FI 5-26-05	0.95	0.96	0.95	0.89	1.06	0.95
13	3-FI 5-26-05	1.03	1.06	0.99	1.04	0.89	1.10
14	4-FI 5-26-05	0.97	1.03	0.91	0.98	0.93	1.02
15	1-FI071905b	1.13	1.19	1.07	1.08	1.16	1.19
16	2-FI071905b	1.12	1.07	1.16	1.17	1.16	1.05
17	1-FI 4-16-02	0.81	0.81	0.82	0.89	0.77	0.74
18	2-FI 4-16-02	0.88	0.86	0.89	0.96	0.83	0.83
19	1-FI 6-14-06	0.72	0.73	0.70	0.59	0.86	0.64
20	2-FI 6-14-06	0.85	0.88	0.83	0.81	0.91	0.75
21	1-FI041706a	0.92	0.90	0.95	0.98	0.85	0.88
22	2-FI041706a	0.92	0.90	0.95	0.92	0.92	0.89
23	3-FI041706a	1.11	1.09	1.12	1.13	1.15	1.07
24	4-FI041706a	1.32	1.36	1.27	1.25	1.32	1.31
25	1- FO 3-13-06	0.96	0.89	1.03	0.98	0.93	0.92
26	2- FO 3-13-06	0.89	0.90	0.87	0.88	0.87	0.91
27	1- FO 5-16-02	0.85	0.81	0.90	1.00	0.72	0.75
28	2- FO 5-16-02	0.47	0.44	0.49	0.47	0.47	0.45
29	1- HV 4-10-03	0.73	0.75	0.70	0.77	0.69	0.72
30	2- KI 7-8-2002	0.89	0.87	0.92	0.92	0.94	0.87
31	1- LN 4-03-03	0.55	0.58	0.53	0.53	0.56	0.56
32	2- LN 4-03-03	0.56	0.53	0.58	0.49	0.65	0.55
33	1- MP 8-21-02	0.71	0.68	0.74	0.64	0.75	0.73
34	1- MP 8-21-02	1.31	1.32	1.30	1.14	1.33	1.46
35	2- MP 8-21-02	1.01	1.06	0.96	1.07	0.95	1.01
36	1- PN 4-01-03	0.71	0.67	0.75	0.71	0.73	0.67
37	2- PN 4-01-03	0.72	0.80	0.64	0.73	0.75	0.70
38	1- RN 6-08-02	0.87	0.83	0.90	0.93	0.92	0.76
39	1- RN 6-05-00	0.37	0.38	0.37	0.37	0.40	0.39
40	1- RP 8-07-02	0.90	0.92	0.88	0.95	0.81	0.95
41	1- RC 7-06-00	0.91	0.91	0.92	0.90	0.98	0.90
42	1-SG 5-55-02	0.66	0.64	0.68	0.59	0.77	0.62
43	2-SG 5-55-02	0.54	0.57	0.50	0.52	0.51	0.55
44	3- SG 5-55-02	0.54	0.55	0.54	0.54	0.52	0.56
45	1- SG 3-14-03	0.54	0.53	0.55	0.53	0.48	0.64
46	2- SG 3-14-03	0.59	0.57	0.61	0.63	0.54	0.63
47	1- SW 5-15-03	1.25	1.32	1.18	1.17	1.26	1.31
48	2- SW 5-15-03	0.94	0.94	0.94	0.94	0.95	0.92
49	1- SN 6-02-05	0.88	0.88	0.87	0.84	0.87	0.91
50	1- SN 7-18-02	0.58	0.58	0.58	0.54	0.73	0.43
51	1- SD 6-15-05	0.93	0.91	0.95	0.84	0.96	0.99
52	2- SD 6-15-05	0.93	0.91	0.95	0.84	0.96	0.99
53	1- SF 6-6-00	0.69	0.72	0.66	0.71	0.65	0.71

was no significant difference between the base set and the subsets A1, A2, B1, and B2. But, there was a small significant difference between the Base set and the subset B3.

Similarly, when the set of CU values under Very Good category (CU>0.85) of the Base set were compared to that of the subsets, there was no significant difference between the base set and any of the subsets. The results of these analyses document that a set of 20 collectors will provide an acceptable data set to assess the coefficient of uniformity and the average depth of application from a section of a center pivot system with low pressure fixed or moving plate sprinklers.

**Table 3.5.** Average depth values from the base data set and the subsets (A1, A2, B1, B2, and B3) for all center pivots (CP) and for those with average depth values that were within the Fair, Good, and Very Good CU categories. T-test results of comparisons between subset data and the base data set are also shown. A single, double, or triple asterisk next to a subset average value indicates a difference between that subset CU value and the base set average value at the 0.1, 0.05, or 0.01 levels of significance.

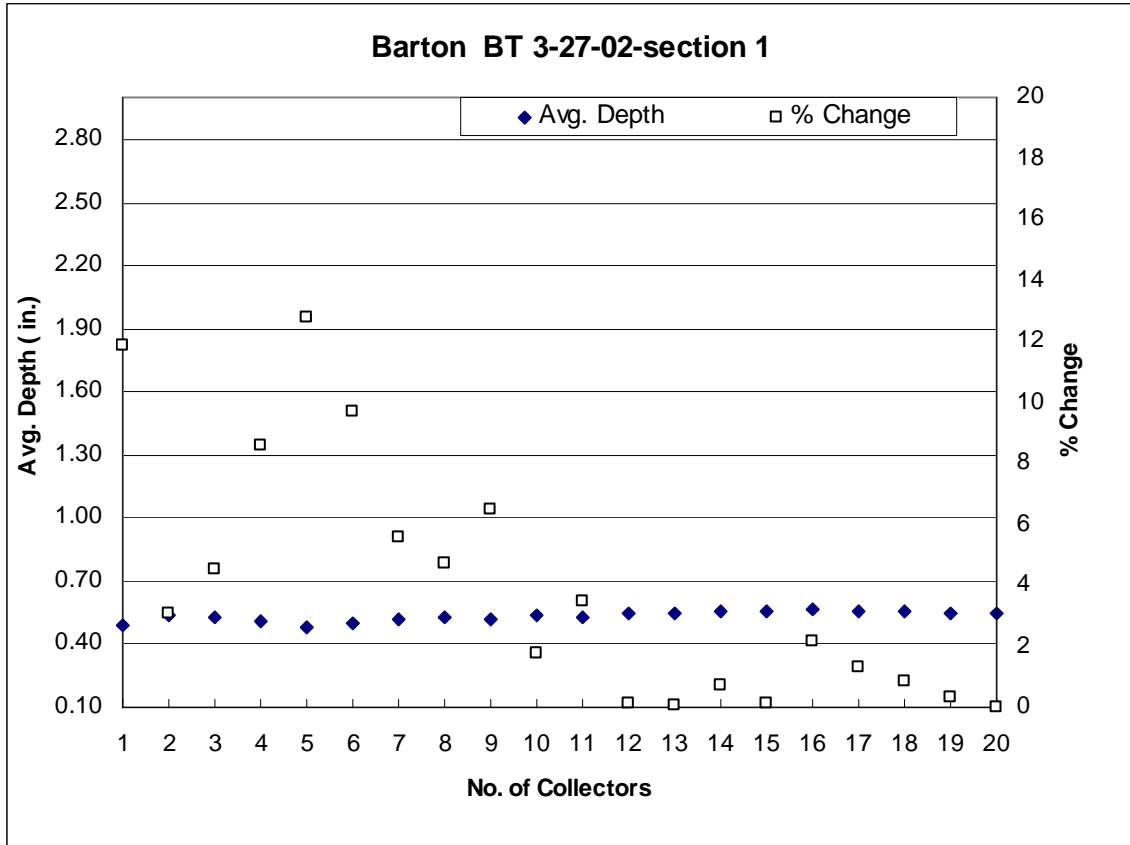
	Average Depths (inches)					
	Base	A1	A2	B1	B2	B3
All CP's	0.84	0.84	0.84	0.83	0.84	0.83
Fair	0.57	0.58	0.56	0.55**	0.59	0.58
Good	0.76	0.76	0.76	0.76	0.77	0.74*
V.Good	1.01	1.00	1.01	1.00	1.01	1.01
*	p<0.1					
**	p<0.05					
***	p<0.01					

### Average Depth Analysis

Figures 4 through 9 and tables 3.6 through 3.11 (associated with system Barton BT 3-27-02) summarizes data of the number of collectors and the related % change (in average depth of the subsets from the average depth of the base set) and average depth in inches. Each figure is related to a base set and the associated subsets. These figures show

the minimum number (number of data points in each subset) of collectors that may be required for an expected value in the percent change in the average depth of a subset from the average depth of the base set. The analysis for the minimum number of collectors associated with a specific target percent change value started with the percent change data for 20 collectors. Then, for a given percent change target (such as 2.5%) the percent change data were compared with the target value for successively lower numbers of collectors until the target percent change value was encountered. The associated number of collectors would be the collector value that precedes the collector value associated with the first occurrence of a percent change value that exceeds the target value.

In the similar fashion, the minimum number of collectors (the number of collectors in a subset) with which the base set can be replaced for different percent changes (2.5%, 5%, 7.5%, 10%, 12.5%, 15%, 17.5%, 20%) in average depth of a subset from the average depth of the base set are tabulated in tables 3.12, 3.13 and 3.14 for the Fair, Good, and Very Good CU categories, respectively for moving plate sprinklers. Similarly, the minimum number of collectors for the same target percent change values for fixed plate sprinklers for the Fair, Good, and Very Good CU categories are summarized in tables 3.15, 3.16, 3.17, respectively. The graphs associated with each section of each irrigation system are in appendix 2.

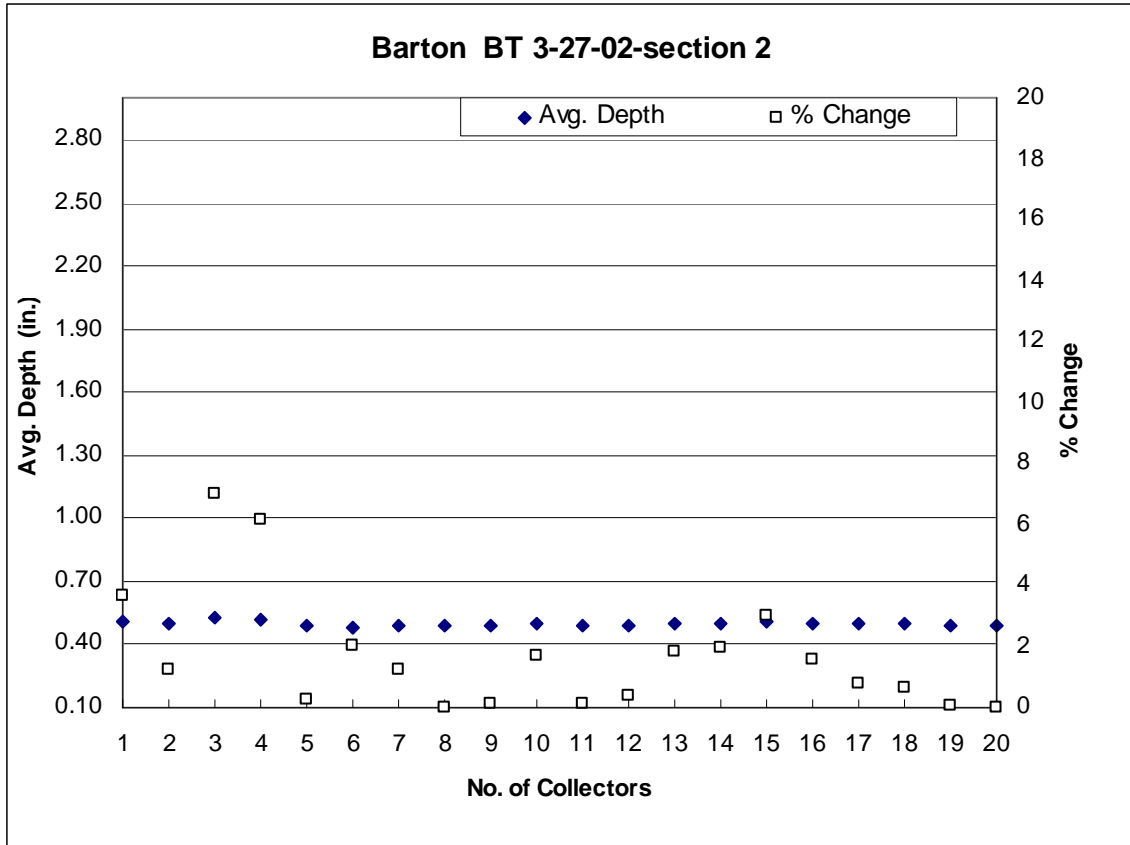


**Figure 4.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors (CU = 84.14,"Good") for the section-1 of the Barton BT 3-27-02 irrigation system data set

**Table 3.6.** Minimum number of collectors for associated target % change values for system BT 3-27-02 section 1 in figure 4 (CU = 84.14,"Good").

% Change Target	Minimum No. of Collectors
2.5 %	12
5.0 %	10
7.5 %	7
10.0 %	6
12.5 %	1
15.0 %	1
17.5 %	1
20.0 %	1

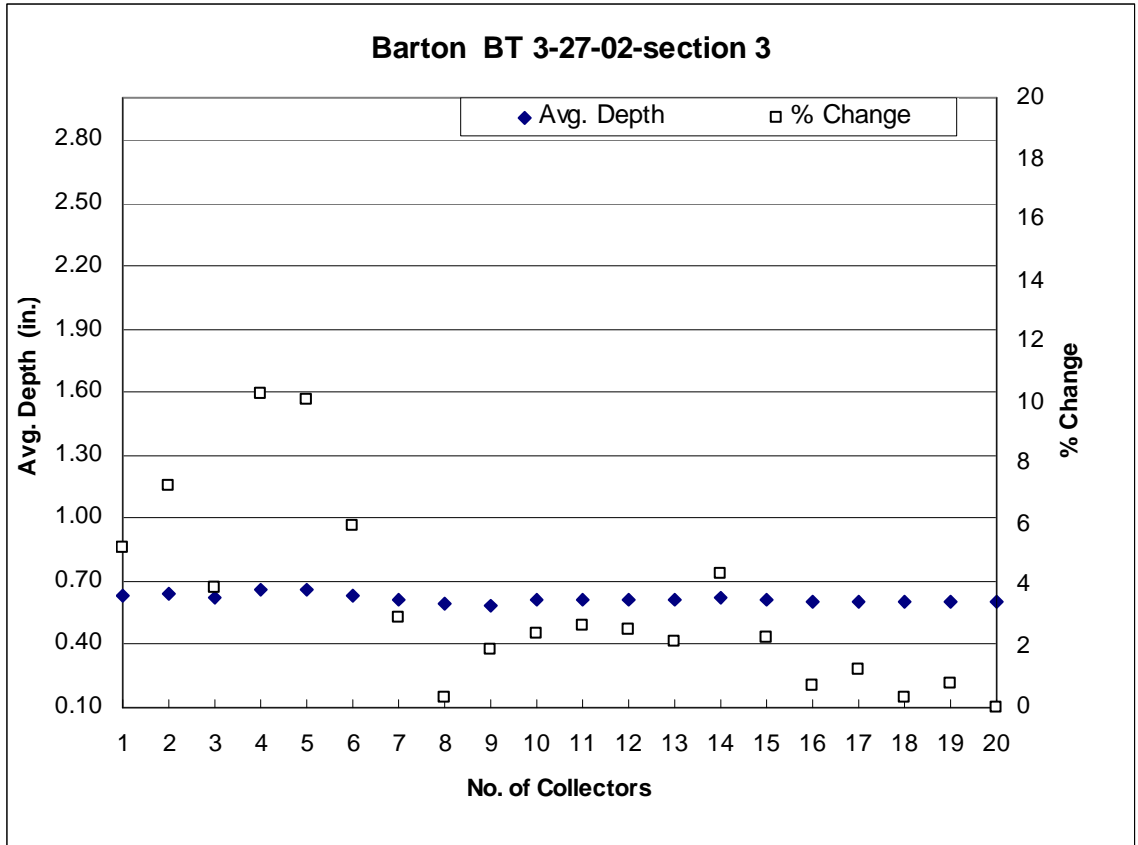




**Figure 5.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors (CU = 89.88, "Very Good") for the section-2 of the Barton BT 3-27-02 irrigation system data set.

**Table 3.7.** Minimum number of collectors for associated target % change values for system BT 3-27-02 section 2 in figure 5 (CU = 89.88, "Very Good").

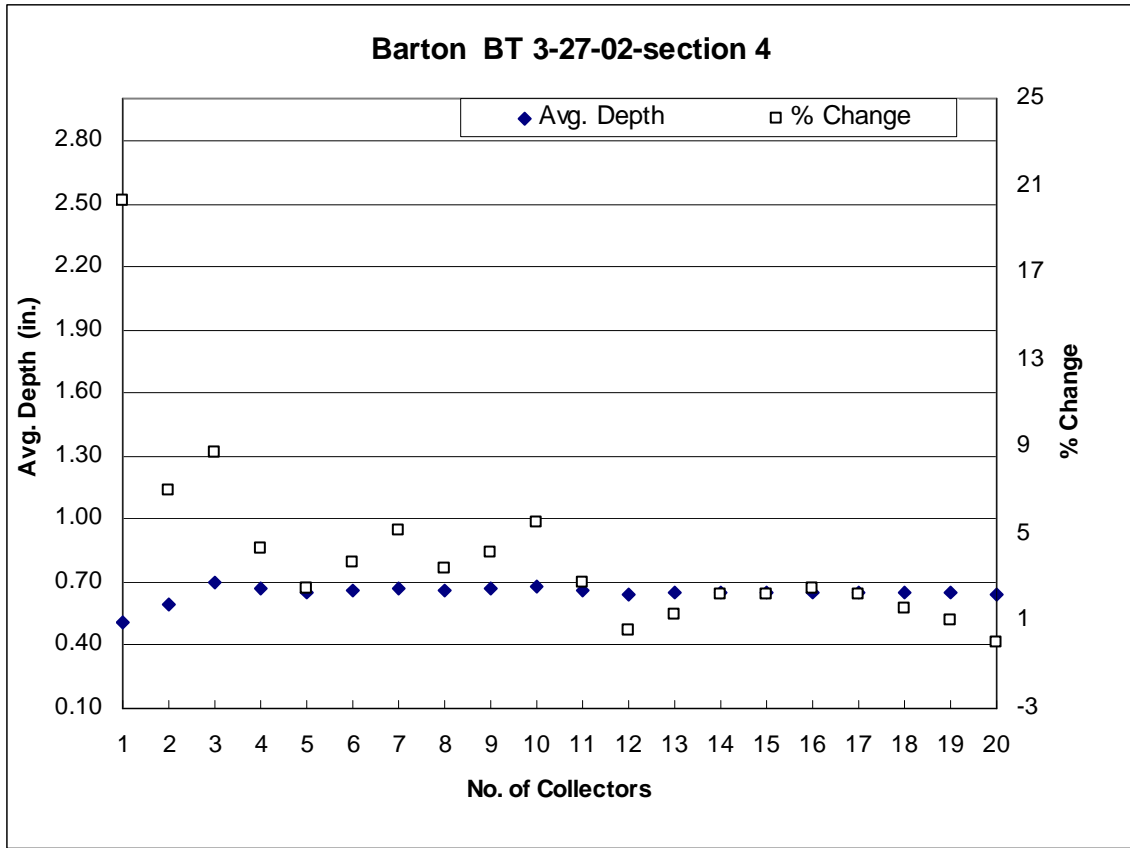
% Change Target	Minimum No. of Collectors
2.5 %	16
5.0 %	5
7.5 %	1
10.0 %	1
12.5 %	1
15.0 %	1
17.5 %	1
20.0 %	1



**Figure 6.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors (CU = 84.62, "Good") for the section-3 of the Barton BT 3-27-02 irrigation system data set.

**Table 3.8.** Minimum number of collectors for associated target % change values for system BT 3-27-02 section 3 in figure 6 (CU = 84.62, "Good").

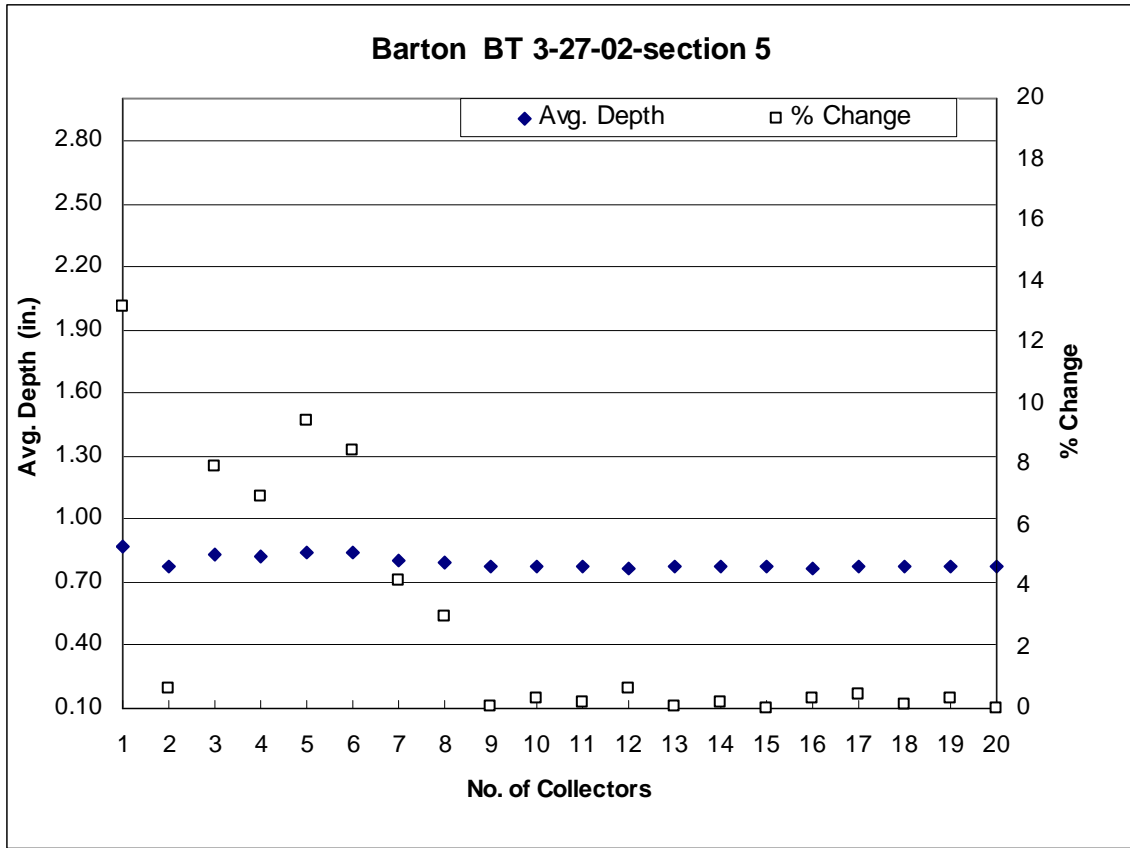
% Change Target	Minimum No. of Collectors
2.5 %	15
5.0 %	7
7.5 %	6
10.0 %	5
12.5 %	1
15.0 %	1
17.5 %	1
20.0 %	1



**Figure 7.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors (CU = 86.91, "Very Good") for the section-4 of the Barton BT 3-27-02 irrigation system data set.

**Table 3.9.** Minimum number of collectors for associated target % change values for system BT 3-27-02 section 4 in figure 7 (CU = 86.91, "Very Good").

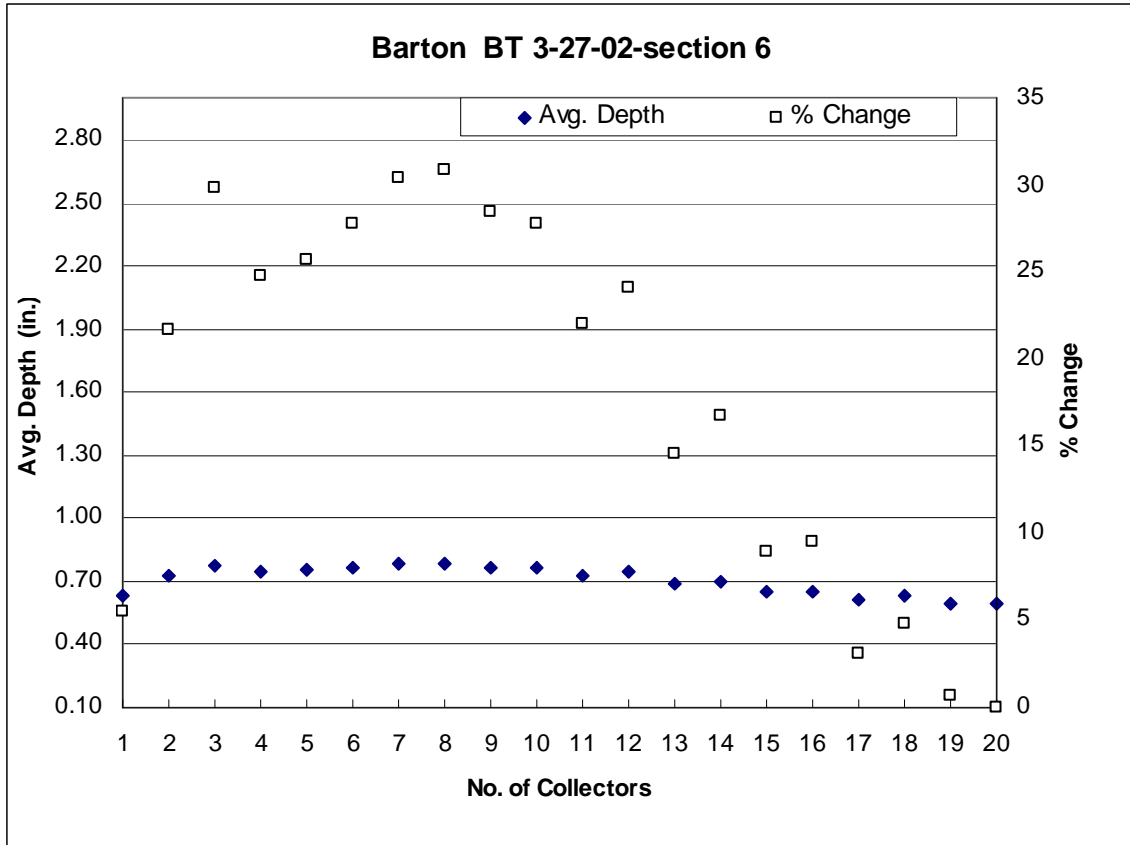
% Change Target	Minimum No. of Collectors
2.5 %	17
5.0 %	11
7.5 %	4
10.0 %	2
12.5 %	1
15.0 %	1
17.5 %	1
20.0 %	1



**Figure 8.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors ( CU = 90.57, "Very Good") for the section-5 of the Barton BT 3-27-02 irrigation system data set.

**Table 3.10.** Minimum number of collectors for associated target % change values for system BT 3-27-02 section 5 in figure 8 (CU = 90.57, "Very Good").

% Change Target	Minimum No. of Collectors
2.5 %	9
5.0 %	7
7.5 %	7
10.0 %	2
12.5 %	2
15.0 %	1
17.5 %	1
20.0 %	1



**Figure 9.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors ( CU = 56.49, "Fair") for the section-6 of the Barton BT 3-27-02 irrigation system data set.

**Table 3.11.** Minimum number of collectors for associated target % change values for system BT 3-27-02 section 6 in figure 9 ( CU = 56.49, "Fair").

% Change Target	Minimum No. of Collectors
2.5 %	19
5.0 %	17
7.5 %	17
10.0 %	15
12.5 %	15
15.0 %	15
17.5 %	13
20.0 %	13

**Table 3.12.** Minimum number of collectors required under different target percent changes (of subset from the base set) of average depth for all the sections (base sets) of all the irrigation systems with moving plate sprinklers for the “Fair” CU category.

CU	Minimum number of collectors for each threshold in %							
	2.5	5	7.5	10	12.5	15	17.5	20
0.15	20	20	20	20	20	18	18	15
0.45	19	17	17	17	16	16	16	15
0.49	20	16	16	14	14	14	13	12
0.49	19	12	11	11	11	6	2	2
0.50	19	17	17	15	15	15	13	13
0.51	19	10	10	10	10	10	10	8
0.54	19	17	15	14	8	8	7	7
0.54	17	12	12	12	12	12	12	12
0.55	18	17	10	10	7	7	7	7
0.55	19	18	15	14	14	13	12	9
0.56	20	13	11	11	11	9	9	9
0.56	19	17	17	15	15	13	13	13
0.58	19	17	15	15	15	11	11	11
0.58	19	17	16	13	12	11	10	10
0.59	18	17	16	15	15	14	12	12
0.60	19	18	17	16	15	13	12	4
0.60	19	18	15	14	4	3	3	3
0.62	20	13	12	11	10	9	9	6
0.62	20	19	18	17	8	8	8	8
0.64	19	9	8	8	7	7	6	6
0.64	18	15	14	13	12	12	10	10
0.66	13	11	5	4	2	2	2	2
0.67	14	14	14	14	12	9	4	4
0.67	18	16	8	8	8	8	8	8
0.67	17	14	14	12	11	10	10	8
0.68	17	12	11	10	10	9	8	8
0.68	18	11	11	11	11	11	10	1
0.69	16	14	12	11	9	8	3	3
0.69	19	8	8	2	2	2	2	2
0.69	18	16	14	13	4	4	2	2
0.69	18	16	13	12	11	10	10	9
0.69	18	16	13	12	11	10	10	9
Average	18	15	13	12	11	10	9	8

**Table 3.13.** Minimum number of collectors required under different target percent changes (of subset from the base set) of average depth for all the sections (base sets) of all the irrigation systems with moving plate sprinklers for the “Good” CU category.

CU	Minimum number of collectors for each threshold in %							
	2.5	5	7.5	10	12.5	15	17.5	20
0.70	19	17	17	15	15	15	2	1
0.70	18	12	12	4	4	4	3	3
0.70	16	11	8	7	6	6	6	5
0.70	20	19	18	17	7	6	6	6
0.72	18	14	13	6	6	6	6	4
0.72	19	19	17	1	1	1	1	1
0.72	20	20	7	7	7	7	4	1
0.72	20	20	7	7	7	7	4	1
0.72	17	11	8	8	8	7	7	7
0.72	18	15	8	5	5	5	3	1
0.73	15	14	13	12	11	5	1	1
0.73	12	6	3	3	3	3	3	1
0.73	20	20	19	13	13	13	1	1
0.73	18	16	15	13	13	12	11	10
0.74	15	14	14	14	14	14	1	1
0.74	17	15	13	10	9	8	7	2
0.75	20	14	12	10	3	1	1	1
0.75	20	16	6	1	1	1	1	1
0.75	18	17	13	12	12	8	8	7
0.76	16	15	14	12	11	11	10	5
0.76	19	19	12	5	1	1	1	1
0.76	15	9	6	4	3	1	1	1
0.76	17	15	12	12	1	1	1	1
0.76	20	20	9	8	7	6	6	6
0.77	17	15	4	4	4	4	3	3
0.77	8	5	5	5	1	1	1	1
0.77	13	9	9	9	9	7	1	1
0.78	18	16	14	12	11	1	1	1
0.78	19	12	10	1	1	1	1	1
0.78	19	12	10	1	1	1	1	1
0.78	18	15	15	15	1	1	1	1
0.79	15	13	12	11	10	1	1	1
0.79	20	19	11	11	1	1	1	1
0.79	13	6	4	4	4	4	4	4
0.79	15	15	4	4	4	1	1	1
0.80	17	14	11	9	7	7	4	1
0.80	14	4	4	4	4	4	4	1
0.80	13	12	2	2	2	2	1	1
0.80	17	14	8	8	3	1	1	1
0.80	16	8	6	6	4	1	1	1
0.80	18	6	6	1	1	1	1	1
0.81	18	15	14	13	12	1	1	1
0.81	17	12	11	10	9	8	7	7
0.81	16	7	7	6	1	1	1	1
0.81	16	14	11	10	9	9	8	7
0.81	12	9	5	5	3	3	3	3
0.81	14	12	10	4	4	4	4	1
0.81	16	15	2	2	2	2	2	2
0.82	13	10	6	6	3	3	1	1
0.82	16	8	7	4	1	1	1	1
0.82	16	13	11	7	1	1	1	1
0.83	16	14	12	12	10	9	2	2
0.83	18	13	13	7	7	7	1	1
0.83	16	13	12	10	10	9	8	7
0.83	13	11	10	2	2	2	2	2
0.84	18	13	5	4	4	4	4	3
0.84	19	19	8	6	4	3	3	2
0.84	18	9	7	6	6	6	1	1
0.84	12	10	7	6	1	1	1	1
Average	17	13	10	7	6	4	3	2

**Table 3.14.** Minimum number of collectors required under different target percent changes (of subset from the base set) of average depth for all the sections (base sets) of all the irrigation systems with moving plate sprinklers for the “Very Good” CU category.

CU	Minimum number of collectors for each threshold in %							
	2.5	5	7.5	10	12.5	15	17.5	20
0.85	15	7	6	6	1	1	1	1
0.85	19	16	6	4	4	4	3	3
0.85	13	10	10	8	7	1	1	1
0.85	11	8	1	1	1	1	1	1
0.86	17	2	2	2	2	2	1	1
0.86	19	15	8	6	1	1	1	1
0.86	19	15	8	6	1	1	1	1
0.86	13	9	1	1	1	1	1	1
0.86	20	18	12	8	1	1	1	1
0.86	13	5	1	1	1	1	1	1
0.86	18	14	11	11	8	8	1	1
0.86	10	8	6	5	4	1	1	1
0.86	19	3	1	1	1	1	1	1
0.87	8	6	6	5	1	1	1	1
0.87	12	4	2	2	2	2	1	1
0.87	17	1	1	1	1	1	1	1
0.87	15	7	6	6	5	4	2	2
0.89	8	6	2	2	2	1	1	1
0.89	6	1	1	1	1	1	1	1
0.89	16	6	2	2	1	1	1	1
0.90	9	1	1	1	1	1	1	1
0.90	16	14	12	5	3	3	1	1
0.90	16	5	1	1	1	1	1	1
0.90	8	4	4	1	1	1	1	1
0.90	7	2	1	1	1	1	1	1
0.90	13	3	2	1	1	1	1	1
0.91	9	7	7	2	1	1	1	1
0.91	13	9	8	1	1	1	1	1
0.91	7	5	5	4	2	1	1	1
0.91	7	5	5	4	2	1	1	1
0.91	14	11	10	5	4	3	1	1
0.92	4	1	1	1	1	1	1	1
0.92	15	6	1	1	1	1	1	1
0.93	4	1	1	1	1	1	1	1
0.93	9	2	2	1	1	1	1	1
0.93	16	1	1	1	1	1	1	1
0.93	11	2	2	2	1	1	1	1
0.94	1	1	1	1	1	1	1	1
0.94	1	1	1	1	1	1	1	1
0.94	8	3	1	1	1	1	1	1
0.94	4	1	1	1	1	1	1	1
0.94	4	1	1	1	1	1	1	1
0.94	1	1	1	1	1	1	1	1
0.94	6	1	1	1	1	1	1	1
0.94	17	1	1	1	1	1	1	1
0.95	5	4	2	2	1	1	1	1
0.95	5	1	1	1	1	1	1	1
0.95	8	1	1	1	1	1	1	1
0.95	6	4	4	3	1	1	1	1
0.95	10	1	1	1	1	1	1	1
0.96	1	1	1	1	1	1	1	1
0.97	9	1	1	1	1	1	1	1
Average	11	5	3	3	2	1	1	1



**Table 3.15.** Minimum number of collectors required under different target percent changes (of subset from the base set) of average depth for all the sections (base sets) of all the irrigation systems with fixed plate sprinklers for the “Fair” CU category.

CU	Minimum number of collectors for each threshold in %							
	2.5	5	7.5	10	12.5	15	17.5	20
0.31	20	20	20	11	11	11	11	11
0.35	20	19	18	17	17	16	16	15
0.46	19	19	19	16	16	16	15	15
0.46	20	16	14	14	12	12	10	10
0.46	20	15	12	11	10	10	10	9
0.48	17	16	15	15	5	5	5	4
0.51	18	17	16	15	15	3	3	3
0.61	20	20	18	18	3	1	1	1
0.63	18	16	14	13	13	12	4	4
0.64	17	15	13	8	8	4	4	4
0.65	14	12	5	5	4	4	4	4
0.65	17	13	13	11	11	9	9	9
0.67	19	17	9	8	7	7	7	6
0.67	16	6	4	4	1	1	1	1
0.68	20	9	5	4	4	4	4	4
0.68	15	15	13	12	12	10	9	8
Average	18	15	13	11	9	8	7	7

**Table 3.16.** Minimum number of collectors required under different target percent changes (of subset from the base set) of average depth for all the sections (base sets) of all the irrigation systems with fixed plate sprinklers for the “Good” CU category.

CU	Minimum number of collectors for each threshold in %							
	2.5	5	7.5	10	12.5	15	17.5	20
0.71	15	15	6	6	6	1	1	1
0.71	17	16	15	12	12	11	9	1
0.71	19	17	16	1	1	1	1	1
0.72	17	17	17	17	17	5	5	3
0.72	8	7	7	7	6	6	6	6
0.72	20	18	13	12	9	7	7	7
0.73	19	12	9	8	7	7	6	1
0.73	20	15	14	12	12	11	9	9
0.73	19	8	7	5	5	4	4	4
0.73	17	13	8	7	6	6	6	5
0.74	17	15	9	9	2	2	2	2
0.74	16	10	8	4	4	3	3	3
0.74	18	16	16	1	1	1	1	1
0.76	15	14	12	12	11	9	4	4
0.76	17	16	13	12	2	1	1	1
0.77	19	7	1	1	1	1	1	1
0.77	14	13	10	7	7	7	6	6
0.78	17	7	7	7	6	6	5	5
0.78	13	11	11	10	7	5	5	1
0.78	9	8	8	6	6	2	2	2
0.78	16	13	7	6	6	6	5	5
0.79	19	8	3	3	3	3	1	1
0.79	16	11	3	3	2	2	2	2
0.79	16	15	8	6	3	2	2	2
0.79	18	6	6	4	4	4	1	1
0.79	20	17	3	3	1	1	1	1
0.80	16	8	8	7	7	6	6	6
0.81	19	5	2	2	2	2	2	2
0.82	16	15	6	5	2	2	1	1
0.82	11	11	9	9	9	8	8	8
0.82	17	4	3	1	1	1	1	1
0.82	20	18	12	1	1	1	1	1
0.83	17	17	17	5	1	1	1	1
0.83	11	10	9	4	3	1	1	1
0.83	6	5	5	3	1	1	1	1
0.83	15	4	4	4	1	1	1	1
0.84	15	13	3	2	2	1	1	1
0.84	17	12	1	1	1	1	1	1
0.84	19	9	7	7	6	4	4	2
0.84	18	7	6	5	4	4	4	2
0.84	17	3	3	1	1	1	1	1
Average	16	11	8	6	5	4	3	3

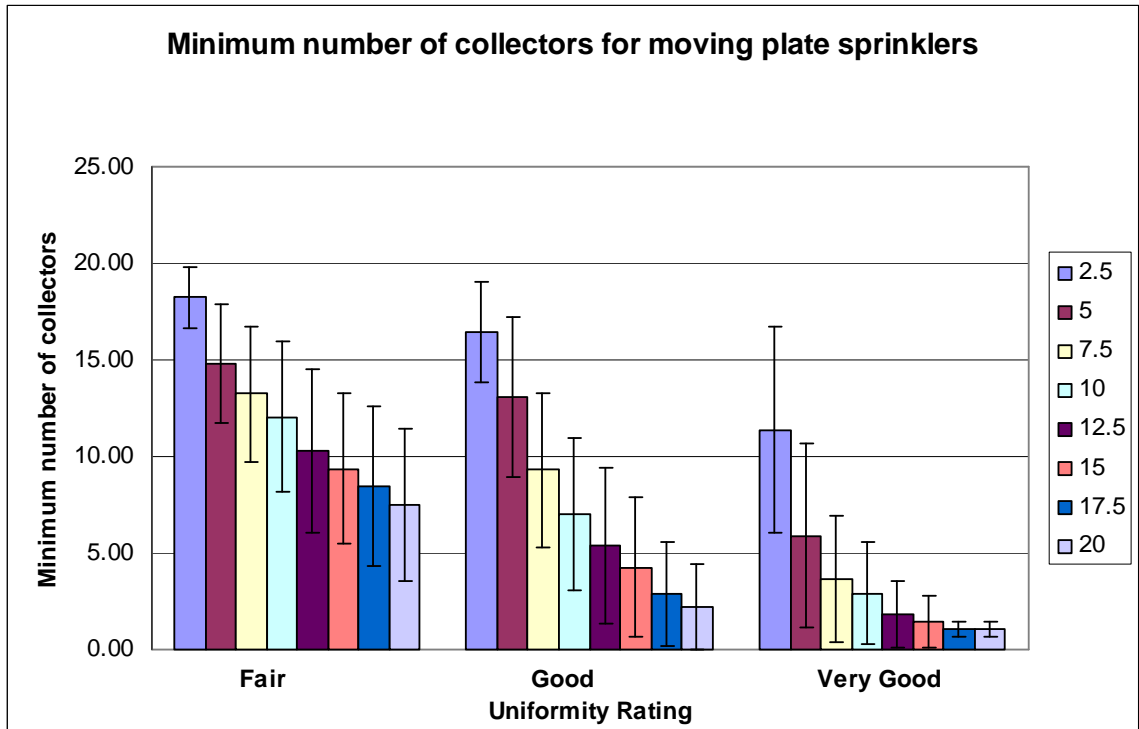
**Table 3.17.** Minimum number of collectors required under different target percent changes (of subset from the base set) of average depth for all the sections (base sets) of all the irrigation systems with fixed plate sprinklers for the “Very Good” CU category.

CU	Minimum number of collectors for each threshold in %							
	2.5	5	7.5	10	12.5	15	17.5	20
0.85	18	6	4	3	1	1	1	1
0.85	14	14	10	8	1	1	1	1
0.85	15	13	2	2	2	2	2	2
0.85	19	15	2	2	2	1	1	1
0.85	14	11	9	7	7	7	5	4
0.86	13	9	5	1	1	1	1	1
0.86	9	6	6	5	5	2	2	1
0.87	17	17	1	1	1	1	1	1
0.87	12	10	10	9	8	8	1	1
0.87	11	4	3	3	3	1	1	1
0.87	16	4	4	4	3	3	2	2
0.87	13	12	10	1	1	1	1	1
0.87	16	12	6	2	2	1	1	1
0.87	10	7	5	2	1	1	1	1
0.88	15	1	1	1	1	1	1	1
0.88	4	4	3	3	3	3	1	1
0.88	11	10	5	4	1	1	1	1
0.88	6	2	2	1	1	1	1	1
0.88	12	10	8	2	1	1	1	1
0.88	11	3	3	3	2	2	2	2
0.88	15	5	4	1	1	1	1	1
0.88	14	8	7	1	1	1	1	1
0.88	15	6	6	2	2	1	1	1
0.88	7	6	5	2	2	2	2	1
0.88	11	9	9	2	2	1	1	1
0.88	6	3	3	2	1	1	1	1
0.89	11	3	3	3	1	1	1	1
0.89	10	2	2	2	2	2	2	2
0.89	16	14	11	9	1	1	1	1
0.89	18	15	12	10	1	1	1	1
0.89	14	10	8	3	2	1	1	1
0.90	15	2	1	1	1	1	1	1
0.90	14	10	5	1	1	1	1	1
0.90	4	1	1	1	1	1	1	1
0.90	10	6	4	4	4	4	1	1
0.91	6	5	1	1	1	1	1	1
0.91	10	4	3	3	3	2	2	1
0.91	12	5	4	3	2	2	1	1
0.91	12	1	1	1	1	1	1	1
0.91	9	3	2	1	1	1	1	1
0.92	8	1	1	1	1	1	1	1
0.92	3	2	1	1	1	1	1	1
0.92	13	10	2	2	2	1	1	1
0.93	16	2	1	1	1	1	1	1
0.93	13	1	1	1	1	1	1	1
0.94	8	5	4	1	1	1	1	1
Average	12	7	4	3	2	2	1	1

Figure 10 and table 3.18 for moving plate, and figure 11 and table 3.18 for fixed plate show the average minimum number of collectors required under the categories of “Fair” (CU<0.70), “Good” (CU between 0.71 and 0.84), and “Very Good” (CU above 0.85) for the different target percent changes (2.5%, 5%, 7.5%, 10%, 12.5%, 15%, 17.5%, 20%) in average depths of the subsets to the average depth of the base set. In general, the minimum number of collectors was reduced for systems with higher CU values and with greater allowable percent differences (percent change) from the actual base set average depth.

Seven collectors may be required for a moving plate type sprinkler irrigation system with a “Fair” CU (CU<0.70) and an allowable 20 % difference from the average depth (of subset from base set). Similarly, for systems with “Fair” CU values, as the acceptable percent difference from the “true” system depth is decreased to 10% or lower, the required number of collectors may increase to from 12 to 18 (table 3.18).

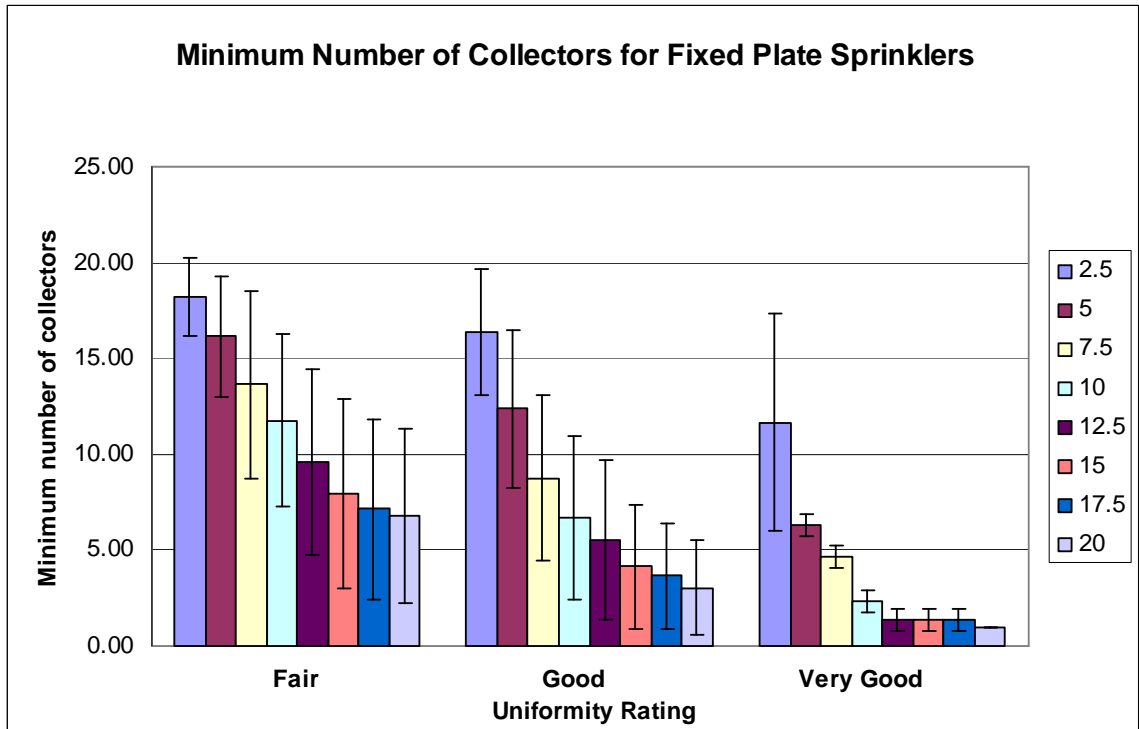
As the system CU increases, fewer collectors are required for accuracy in measurements. For example, for target (allowable) percent change values of 20%, 15%, 10%, and 5%, moving plate systems with a “Good” CU rating will require 2, 4, 7, and 13 collectors, respectively. Similarly, moving plate systems with a “Very Good” CU rating will only require 1, 2, 3, and 6 collectors, respectively for the same % change tolerances. Very similar results were found with the data from the fixed plate sprinklers (figure 11 and table 3.17).



**Figure 10.** The average minimum number of collectors required for moving plate type sprinklers to achieve an average depth within 2.5%, 5%, ....20% of the average depth from the base data set (20 collectors) for CU categories of “Fair”, “Good” and “Very Good”.

**Table 3.18.** Minimum number of collectors required for target percent change allowances for moving and fixed plate sprinklers on systems with “Fair”, “Good” and “Very Good” CU values.

% Change Allowance	Fair CU		Good CU		Very Good CU	
	Moving Plate	Fixed Plate	Moving Plate	Fixed Plate	Moving Plate	Fixed Plate
2.5	18	18	16	16	11	12
5.0	15	16	13	12	6	6
7.5	13	14	9	9	4	5
10.0	12	12	7	7	3	2
12.5	10	10	5	5	2	1
15.0	9	8	4	4	2	1
17.5	8	7	2	4	1	1
20.0	7	7	2	3	1	1



**Figure 11.** The average minimum number of collectors required for fixed plate type sprinklers to achieve an average depth within 2.5%, 5%, ....20% of the average depth from the base data set (20 collectors) for CU categories of “Fair”, “Good” and “Very Good”.

## **CHAPTER 4 - Summary and Conclusions**

A statistical data analysis was performed using 26 center pivot sprinkler irrigation system data sets. These data sets were collected from field measurements from 1998 to 2005. The irrigation system sprinkler data contained measured depths from moving-plate and fixed-plate sprinklers. Sprinkler spacings on these systems ranged from 1.22 m to 3.67 m. Application depth and uniformity test data were collected using 10 cm diameter IrriGage collectors. The data were analyzed to address two objectives. The objectives were to determine the minimum number of collectors to conduct a uniformity analysis and to accurately measure the average depth of application.

In the uniformity analysis, 26 center pivot sprinkler irrigation system data sets were divided into base sets of each containing 60 data points. Each base set was further divided into subsets containing 30 data points (50% of base set) and 20 data points (33.33% of base set). The CU values for the base sets and subsets were calculated. Statistical one tail t-tests were performed to compare the set of base set CU values with the set of CU values of subsets.

In the average depth analysis, 26 center pivot sprinkler irrigation systems were divided into base sets that each contained 20 data points. The data points in the base set were identified by numbers from 1 to 20. Each base set was divided into 19 subsets. The 1<sup>st</sup> subset was generated by removing an exterior data point from the base set which was identified by number 1. The 2<sup>nd</sup> subset was generated by removing the opposing exterior

data point (identified by number 20) from the previously generated subset (1<sup>st</sup> subset). Subsequent subsets were generated using this procedure.

The average depth and coefficient of uniformity (CU, Christiansen, 1942) for each base set and subset were calculated.

Both analyses documented that reduced numbers of collectors may be used to determine the CU of a center pivot system and to determine the average depth from a section of a system. The average depth analysis (second analysis) resulted in decrease of collectors by 50% and the uniformity analysis (first analysis) resulted in decrease of collectors by as much as 67%. In the uniformity analysis, the subsets containing 30 collectors and 20 collectors were compared to base set(s) of 60 collectors. The t-test results showed that (when sets as a whole were compared without breaking up into fair, good and very good CU categories) subsets with 20 and 30 collectors were not different from the base set.

The average depth analysis documented that the number of collectors required to accurately measure the average depth from a section of a center pivot system is inversely related to the allowable difference (% change) of the “true” average depth. Also, that the CU of the system influences the required minimum number of collectors. Systems with Very Good CU values ( $>0.85$ ) may need six collectors to be within 5% of the mean depth, while systems with a Good CU ( $0.70 < CU < 0.85$ ) may need to use 12 to 13 collectors for the same percent difference tolerance of 5%.



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## **Appendix A – Tables**

Table Showing (analysis 1: Uniformity Analysis) Base data subsets of center pivot measured depths at progressive radial distances from the pivot point for segments of all the 26 center pivot irrigation data sets.

**Table A.1.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment I of system Barton BT 3-27-02.

Collector No.	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)
1	326	0.58	326	0.58	334	0.51	326	0.58	334	0.51	342	0.73
2	334	0.51	342	0.73	350	0.61	350	0.61	358	0.75	366	0.78
3	342	0.73	358	0.75	366	0.78	374	0.56	382	0.58	390	0.44
4	350	0.61	374	0.56	382	0.58	398	0.58	406	0.49	414	0.51
5	358	0.75	390	0.44	398	0.58	422	0.39	430	0.66	438	0.44
6	366	0.78	406	0.49	414	0.51	446	0.44	454	0.56	462	0.51
7	374	0.56	422	0.39	430	0.66	470	0.49	478	0.44	486	0.49
8	382	0.58	438	0.44	446	0.44	494	0.49	502	0.39	510	0.51
9	390	0.44	454	0.56	462	0.51	518	0.51	526	0.58	534	0.53
10	398	0.58	470	0.49	478	0.44	542	0.44	550	0.51	558	0.49
11	406	0.49	486	0.49	494	0.49	566	0.51	574	0.58	582	0.36
12	414	0.51	502	0.39	510	0.51	590	0.51	598	0.49	606	0.41
13	422	0.39	518	0.51	526	0.58	614	0.58	622	0.58	630	0.44
14	430	0.66	534	0.53	542	0.44	638	0.44	646	0.51	654	0.51
15	438	0.44	550	0.51	558	0.49	662	0.46	670	0.80	678	0.61
16	446	0.44	566	0.51	574	0.58	686	0.85	694	0.46	702	0.51
17	454	0.56	582	0.36	590	0.51	710	0.78	718	0.66	726	0.63
18	462	0.51	598	0.49	606	0.41	734	0.58	742	0.66	750	0.51
19	470	0.49	614	0.58	622	0.58	758	0.51	766	0.63	774	0.58
20	478	0.44	630	0.44	638	0.44	782	0.44	790	0.66	798	0.66
21	486	0.49	646	0.51	654	0.51						
22	494	0.49	662	0.46	670	0.80						
23	502	0.39	678	0.61	686	0.85						
24	510	0.51	694	0.46	702	0.51						
25	518	0.51	710	0.78	718	0.66						
26	526	0.58	726	0.63	734	0.58						
27	534	0.53	742	0.66	750	0.51						
28	542	0.44	758	0.51	766	0.63						
29	550	0.51	774	0.58	782	0.44						
30	558	0.49	790	0.66	798	0.66						
31	566	0.51										
32	574	0.58										
33	582	0.36										
34	590	0.51										
35	598	0.49										
36	606	0.41										
37	614	0.58										
38	622	0.58										
39	630	0.44										
40	638	0.44										
41	646	0.51										
42	654	0.51										
43	662	0.46										
44	670	0.80										
45	678	0.61										
46	686	0.85										
47	694	0.46										
48	702	0.51										
49	710	0.78										
50	718	0.66										
51	726	0.63										
52	734	0.58										
53	742	0.66										
54	750	0.51										
55	758	0.51										
56	766	0.63										
57	774	0.58										
58	782	0.44										
59	790	0.66										
60	798	0.66										

**Table A.2.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment II of system Barton BT 3-27-02.

Collector No.	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)
1	774	0.58	774	0.58	782	0.44	774	0.58	782	0.44	790	0.66
2	782	0.44	790	0.66	798	0.66	798	0.66	806	0.51	814	0.58
3	790	0.66	806	0.51	814	0.58	822	0.68	830	0.73	838	0.49
4	798	0.66	822	0.68	830	0.73	846	0.75	854	0.58	862	0.70
5	806	0.51	838	0.49	846	0.75	870	0.58	878	0.68	886	0.51
6	814	0.58	854	0.58	862	0.70	894	0.90	902	0.61	910	0.73
7	822	0.68	870	0.58	878	0.68	918	0.70	926	0.49	934	0.70
8	830	0.73	886	0.51	894	0.90	942	0.66	950	0.63	958	0.58
9	838	0.49	902	0.61	910	0.73	966	0.73	974	0.73	982	0.73
10	846	0.75	918	0.70	926	0.49	990	0.80	998	0.73	1006	0.80
11	854	0.58	934	0.70	942	0.66	1014	0.73	1022	0.80	1030	0.80
12	862	0.70	950	0.63	958	0.58	1038	0.68	1046	0.87	1054	0.95
13	870	0.58	966	0.73	974	0.73	1062	0.92	1070	0.61	1078	0.58
14	878	0.68	982	0.73	990	0.80	1086	0.73	1094	0.83	1102	0.75
15	886	0.51	998	0.73	1006	0.80	1110	0.87	1118	0.80	1126	0.68
16	894	0.90	1014	0.73	1022	0.80	1134	0.80	1142	0.70	1150	0.87
17	902	0.61	1030	0.80	1038	0.68	1158	0.87	1166	0.73	1174	0.80
18	910	0.73	1046	0.87	1054	0.95	1182	0.83	1190	0.66	1198	0.83
19	918	0.70	1062	0.92	1070	0.61	1206	0.63	1214	0.87	1222	0.78
20	926	0.49	1078	0.58	1086	0.73	1230	0.87	1238	0.66	1246	0.39
21	934	0.70	1094	0.83	1102	0.75						
22	942	0.66	1110	0.87	1118	0.80						
23	950	0.63	1126	0.68	1134	0.80						
24	958	0.58	1142	0.70	1150	0.87						
25	966	0.73	1158	0.87	1166	0.73						
26	974	0.73	1174	0.80	1182	0.83						
27	982	0.73	1190	0.66	1198	0.83						
28	990	0.80	1206	0.63	1214	0.87						
29	998	0.73	1222	0.78	1230	0.87						
30	1006	0.80	1238	0.66	1246	0.39						
31	1014	0.73										
32	1022	0.80										
33	1030	0.80										
34	1038	0.68										
35	1046	0.87										
36	1054	0.95										
37	1062	0.92										
38	1070	0.61										
39	1078	0.58										
40	1086	0.73										
41	1094	0.83										
42	1102	0.75										
43	1110	0.87										
44	1118	0.80										
45	1126	0.68										
46	1134	0.80										
47	1142	0.70										
48	1150	0.87										
49	1158	0.87										
50	1166	0.73										
51	1174	0.80										
52	1182	0.83										
53	1190	0.66										
54	1198	0.83										
55	1206	0.63										
56	1214	0.87										
57	1222	0.78										
58	1230	0.87										
59	1238	0.66										
60	1246	0.39										

**Table A.3.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment I of system Circle Land and Cattle CoFI052306a(K).

Collector	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	No.	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)
1	24	5.20	24.00	5.20	30	3.09	24	5.20	30	3.09	36	0.29
2	30	3.09	36	0.29	42	2.55	42	2.55	48	1.17	54	4.20
3	36	0.29	48	1.17	54	4.20	60	1.17	66	0.36	72	0.44
4	42	2.55	60	1.17	66	0.36	78	1.14	84	1.09	90	0.29
5	48	1.17	72	0.44	78	1.14	96	0.95	102	0.12	108	0.19
6	54	4.20	84	1.09	90	0.29	114	0.15	120	0.05	126	2.55
7	60	1.17	96	0.95	102	0.12	132	0.27	138	0.80	144	0.29
8	66	0.36	108	0.19	114	0.15	150	1.17	156	0.22	162	0.22
9	72	0.44	120	0.05	126	2.55	168	0.53	174	0.44	180	0.58
10	78	1.14	132	0.27	138	0.80	186	1.68	192	0.44	198	0.51
11	84	1.09	144	0.29	150	1.17	204	0.51	210	1.68	216	0.51
12	90	0.29	156	0.22	162	0.22	222	1.17	228	0.36	234	0.49
13	96	0.95	168	0.53	174	0.44	240	0.49	246	0.51	252	0.32
14	102	0.12	180	0.58	186	1.68	258	0.41	264	0.66	270	1.60
15	108	0.19	192	0.44	198	0.51	276	1.75	282	0.49	288	0.46
16	114	0.15	204	0.51	210	1.68	294	0.53	300	0.70	306	0.46
17	120	0.05	216	0.51	222	1.17	312	0.46	318	0.36	324	0.34
18	126	2.55	228	0.36	234	0.49	330	0.51	336	0.58	342	1.24
19	132	0.27	240	0.49	246	0.51	348	0.51	354	0.58	360	0.53
20	138	0.80	252	0.32	258	0.41	366	2.07	372	1.94	378	0.61
21	144	0.29	264	0.66	270	1.60						
22	150	1.17	276	1.75	282	0.49						
23	156	0.22	288	0.46	294	0.53						
24	162	0.22	300	0.70	306	0.46						
25	168	0.53	312	0.46	318	0.36						
26	174	0.44	324	0.34	330	0.51						
27	180	0.58	336	0.58	342	1.24						
28	186	1.68	348	0.51	354	0.58						
29	192	0.44	360	0.53	366	2.07						
30	198	0.51	372	1.94	378	0.61						
31	204	0.51										
32	210	1.68										
33	216	0.51										
34	222	1.17										
35	228	0.36										
36	234	0.49										
37	240	0.49										
38	246	0.51										
39	252	0.32										
40	258	0.41										
41	264	0.66										
42	270	1.60										
43	276	1.75										
44	282	0.49										
45	288	0.46										
46	294	0.53										
47	300	0.70										
48	306	0.46										
49	312	0.46										
50	318	0.36										
51	324	0.34										
52	330	0.51										
53	336	0.58										
54	342	1.24										
55	348	0.51										
56	354	0.58										
57	360	0.53										
58	366	2.07										
59	372	1.94										
60	378	0.61										

**Table A.4.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment II of system Circle Land and Cattle CoFI052306a(K).

Collector	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	radius	depth	radius	depth	radius	depth	radius	depth	radius	depth	radius	depth
No.	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)
1	384	0.56	384	0.56	390	0.66	384	0.56	390	0.66	396	0.51
2	390	0.66	396	0.51	402	0.44	402	0.44	408	0.51	414	0.51
3	396	0.51	408	0.51	414	0.51	420	0.75	426	0.49	432	1.97
4	402	0.44	420	0.75	426	0.49	438	0.66	444	1.68	450	1.31
5	408	0.51	432	1.97	438	0.66	456	0.58	462	0.63	468	0.58
6	414	0.51	444	1.68	450	1.31	474	0.44	478	0.80	484	0.34
7	420	0.75	456	0.58	462	0.63	486	0.41	492	0.56	498	0.56
8	426	0.49	468	0.58	474	0.44	504	0.56	510	0.49	516	1.02
9	432	1.97	478	0.80	484	0.34	522	0.49	528	0.51	534	0.49
10	438	0.66	486	0.41	492	0.56	540	0.46	546	1.41	552	0.58
11	444	1.68	498	0.56	504	0.56	558	0.53	564	0.49	570	1.65
12	450	1.31	510	0.49	516	1.02	576	1.63	582	0.44	588	0.58
13	456	0.58	522	0.49	528	0.51	594	0.49	600	0.58	606	0.58
14	462	0.63	534	0.49	540	0.46	612	0.46	618	0.39	624	0.51
15	468	0.58	546	1.41	552	0.58	630	0.51	636	0.51	642	0.44
16	474	0.44	558	0.53	564	0.49	648	0.51	654	0.66	660	0.73
17	478	0.80	570	1.65	576	1.63	666	0.51	672	0.41	678	0.70
18	484	0.34	582	0.44	588	0.58	684	0.56	690	1.07	696	0.61
19	486	0.41	594	0.49	600	0.58	702	0.51	708	0.51	714	0.44
20	492	0.56	606	0.58	612	0.46	720	0.51	726	0.56	732	0.56
21	498	0.56	618	0.39	624	0.51						
22	504	0.56	630	0.51	636	0.51						
23	510	0.49	642	0.44	648	0.51						
24	516	1.02	654	0.66	660	0.73						
25	522	0.49	666	0.51	672	0.41						
26	528	0.51	678	0.70	684	0.56						
27	534	0.49	690	1.07	696	0.61						
28	540	0.46	702	0.51	708	0.51						
29	546	1.41	714	0.44	720	0.51						
30	552	0.58	726	0.56	732	0.56						
31	558	0.53										
32	564	0.49										
33	570	1.65										
34	576	1.63										
35	582	0.44										
36	588	0.58										
37	594	0.49										
38	600	0.58										
39	606	0.58										
40	612	0.46										
41	618	0.39										
42	624	0.51										
43	630	0.51										
44	636	0.51										
45	642	0.44										
46	648	0.51										
47	654	0.66										
48	660	0.73										
49	666	0.51										
50	672	0.41										
51	678	0.70										
52	684	0.56										
53	690	1.07										
54	696	0.61										
55	702	0.51										
56	708	0.51										
57	714	0.44										
58	720	0.51										
59	726	0.56										
60	732	0.56										



**Table A.5.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment III of system Circle Land and Cattle CoFI052306a(K).

Collector No.	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)
1	738	0.56	738	0.56	744	0.56	738	0.56	744	0.56	750	0.56
2	744	0.56	750	0.56	756	0.51	756	0.51	762	0.49	768	0.46
3	750	0.56	762	0.49	768	0.46	774	1.60	780	0.44	786	0.56
4	756	0.51	774	1.60	780	0.44	792	0.66	798	0.46	804	0.29
5	762	0.49	786	0.56	792	0.66	810	0.46	816	0.58	822	0.68
6	768	0.46	798	0.46	804	0.29	828	0.51	834	1.70	840	0.63
7	774	1.60	810	0.46	816	0.58	846	0.51	852	0.51	858	0.46
8	780	0.44	822	0.68	828	0.51	864	0.66	870	0.56	876	1.97
9	786	0.56	834	1.70	840	0.63	882	0.49	888	0.49	894	0.58
10	792	0.66	846	0.51	852	0.51	900	0.49	906	0.51	912	0.49
11	798	0.46	858	0.46	864	0.66	918	0.49	924	0.46	930	0.46
12	804	0.29	870	0.56	876	1.97	934	0.41	940	0.51	942	0.44
13	810	0.46	882	0.49	888	0.49	948	0.51	954	0.51	960	0.56
14	816	0.58	894	0.58	900	0.49	966	0.51	978	0.53	984	0.66
15	822	0.68	906	0.51	912	0.49	990	0.63	996	0.44	1002	0.51
16	828	0.51	918	0.49	924	0.46	1008	0.53	1014	0.51	1020	0.58
17	834	1.70	930	0.46	934	0.41	1026	0.51	1032	0.51	1038	0.53
18	840	0.63	940	0.51	942	0.44	1044	0.63	1050	0.51	1056	0.58
19	846	0.51	948	0.51	954	0.51	1062	0.80	1068	0.56	1074	0.46
20	852	0.51	960	0.56	966	0.51	1080	0.58	1086	0.49	1092	0.90
21	858	0.46	978	0.53	984	0.66						
22	864	0.66	990	0.63	996	0.44						
23	870	0.56	1002	0.51	1008	0.53						
24	876	1.97	1014	0.51	1020	0.58						
25	882	0.49	1026	0.51	1032	0.51						
26	888	0.49	1038	0.53	1044	0.63						
27	894	0.58	1050	0.51	1056	0.58						
28	900	0.49	1062	0.80	1068	0.56						
29	906	0.51	1074	0.46	1080	0.58						
30	912	0.49	1086	0.49	1092	0.90						
31	918	0.49										
32	924	0.46										
33	930	0.46										
34	934	0.41										
35	940	0.51										
36	942	0.44										
37	948	0.51										
38	954	0.51										
39	960	0.56										
40	966	0.51										
41	978	0.53										
42	984	0.66										
43	990	0.63										
44	996	0.44										
45	1002	0.51										
46	1008	0.53										
47	1014	0.51										
48	1020	0.58										
49	1026	0.51										
50	1032	0.51										
51	1038	0.53										
52	1044	0.63										
53	1050	0.51										
54	1056	0.58										
55	1062	0.80										
56	1068	0.56										
57	1074	0.46										
58	1080	0.58										
59	1086	0.49										
60	1092	0.90										

**Table A.6.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment IV of system Circle Land and Cattle CoFI052306a(K).

Collector	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	No.	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)
1	1098	0.73	1098	0.73	1104	0.51	1098	0.73	1104	0.51	1110	0.61
2	1104	0.51	1110	0.61	1116	0.66	1116	0.66	1122	0.58	1128	0.58
3	1110	0.61	1122	0.58	1128	0.58	1134	0.70	1140	0.63	1146	0.49
4	1116	0.66	1134	0.70	1140	0.63	1152	0.49	1158	0.66	1164	0.61
5	1122	0.58	1146	0.49	1152	0.49	1170	0.61	1176	0.66	1182	0.61
6	1128	0.58	1158	0.66	1164	0.61	1188	0.61	1194	0.61	1200	1.02
7	1134	0.70	1170	0.61	1176	0.66	1206	0.49	1212	0.95	1218	0.58
8	1140	0.63	1182	0.61	1188	0.61	1224	0.44	1230	0.58	1236	0.66
9	1146	0.49	1194	0.61	1200	1.02	1242	0.58	1248	0.63	1254	0.66
10	1152	0.49	1206	0.49	1212	0.95	1260	0.58	1266	0.61	1272	0.56
11	1158	0.66	1218	0.58	1224	0.44	1278	0.58	1284	0.58	1290	0.63
12	1164	0.61	1230	0.58	1236	0.66	1296	0.58	1302	0.70	1308	0.58
13	1170	0.61	1242	0.58	1248	0.63	1314	0.58	1320	0.58	1326	0.56
14	1176	0.66	1254	0.66	1260	0.58	1332	0.66	1338	1.53	1344	0.58
15	1182	0.61	1266	0.61	1272	0.56	1350	0.95	1356	0.58	1362	0.51
16	1188	0.61	1278	0.58	1284	0.58	1368	0.66	1374	0.80	1380	0.73
17	1194	0.61	1290	0.63	1296	0.58	1386	0.70	1392	0.63	1398	0.58
18	1200	1.02	1302	0.70	1308	0.58	1404	0.63	1410	0.58	1416	1.75
19	1206	0.49	1314	0.58	1320	0.58	1422	0.63	1428	0.66	1434	0.56
20	1212	0.95	1326	0.56	1332	0.66	1440	0.58	1446	0.66	1452	0.87
21	1218	0.58	1338	1.53	1344	0.58						
22	1224	0.44	1350	0.95	1356	0.58						
23	1230	0.58	1362	0.51	1368	0.66						
24	1236	0.66	1374	0.80	1380	0.73						
25	1242	0.58	1386	0.70	1392	0.63						
26	1248	0.63	1398	0.58	1404	0.63						
27	1254	0.66	1410	0.58	1416	1.75						
28	1260	0.58	1422	0.63	1428	0.66						
29	1266	0.61	1434	0.56	1440	0.58						
30	1272	0.56	1446	0.66	1452	0.87						
31	1278	0.58										
32	1284	0.58										
33	1290	0.63										
34	1296	0.58										
35	1302	0.70										
36	1308	0.58										
37	1314	0.58										
38	1320	0.58										
39	1326	0.56										
40	1332	0.66										
41	1338	1.53										
42	1344	0.58										
43	1350	0.95										
44	1356	0.58										
45	1362	0.51										
46	1368	0.66										
47	1374	0.80										
48	1380	0.73										
49	1386	0.70										
50	1392	0.63										
51	1398	0.58										
52	1404	0.63										
53	1410	0.58										
54	1416	1.75										
55	1422	0.63										
56	1428	0.66										
57	1434	0.56										
58	1440	0.58										
59	1446	0.66										
60	1452	0.87										

**Table A.7.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment V of system Circle Land and Cattle CoFI052306a(K).

Collector	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	radius	depth	radius	depth	radius	depth	radius	depth	radius	depth	radius	depth
No.	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)
1	1458	0.66	1458.00	0.66	1464	0.73	1458	0.66	1464	0.73	1470	0.63
2	1464	0.73	1470	0.63	1476	0.66	1476	0.66	1482	0.66	1488	0.61
3	1470	0.63	1482	0.66	1488	0.61	1494	0.63	1500	0.66	1506	1.75
4	1476	0.66	1494	0.63	1500	0.66	1512	0.46	1518	2.11	1524	0.80
5	1482	0.66	1506	1.75	1512	0.46	1530	0.58	1536	0.56	1542	0.61
6	1488	0.61	1518	2.11	1524	0.80	1548	0.63	1554	0.66	1560	0.75
7	1494	0.63	1530	0.58	1536	0.56	1566	0.66	1572	0.58	1578	0.66
8	1500	0.66	1542	0.61	1548	0.63	1584	0.66	1590	0.66	1596	0.80
9	1506	1.75	1554	0.66	1560	0.75	1602	0.66	1608	0.63	1614	0.61
10	1512	0.46	1566	0.66	1572	0.58	1620	0.66	1626	0.61	1632	0.66
11	1518	2.11	1578	0.66	1584	0.66	1638	0.73	1644	0.68	1650	0.58
12	1524	0.80	1590	0.66	1596	0.80	1656	0.44	1662	0.63	1668	0.56
13	1530	0.58	1602	0.66	1608	0.63	1674	0.53	1680	0.51	1686	0.58
14	1536	0.56	1614	0.61	1620	0.66	1692	0.58	1698	0.58	1704	0.51
15	1542	0.61	1626	0.61	1632	0.66	1710	0.41	1716	0.66	1722	0.51
16	1548	0.63	1638	0.73	1644	0.68	1728	0.66	1734	1.46	1740	0.75
17	1554	0.66	1650	0.58	1656	0.44	1746	0.78	1752	0.73	1758	0.78
18	1560	0.75	1662	0.63	1668	0.56	1764	0.66	1770	0.66	1776	0.51
19	1566	0.66	1674	0.53	1680	0.51	1782	0.63	1788	0.73	1794	0.63
20	1572	0.58	1686	0.58	1692	0.58	1800	0.56	1806	0.75	1812	1.24
21	1578	0.66	1698	0.58	1704	0.51						
22	1584	0.66	1710	0.41	1716	0.66						
23	1590	0.66	1722	0.51	1728	0.66						
24	1596	0.80	1734	1.46	1740	0.75						
25	1602	0.66	1746	0.78	1752	0.73						
26	1608	0.63	1758	0.78	1764	0.66						
27	1614	0.61	1770	0.66	1776	0.51						
28	1620	0.66	1782	0.63	1788	0.73						
29	1626	0.61	1794	0.63	1800	0.56						
30	1632	0.66	1806	0.75	1812	1.24						
31	1638	0.73										
32	1644	0.68										
33	1650	0.58										
34	1656	0.44										
35	1662	0.63										
36	1668	0.56										
37	1674	0.53										
38	1680	0.51										
39	1686	0.58										
40	1692	0.58										
41	1698	0.58										
42	1704	0.51										
43	1710	0.41										
44	1716	0.66										
45	1722	0.51										
46	1728	0.66										
47	1734	1.46										
48	1740	0.75										
49	1746	0.78										
50	1752	0.73										
51	1758	0.78										
52	1764	0.66										
53	1770	0.66										
54	1776	0.51										
55	1782	0.63										
56	1788	0.73										
57	1794	0.63										
58	1800	0.56										
59	1806	0.75										
60	1812	1.24										

**Table A.8.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment I of system Circle Land and Cattle CoFI060606a(K).

Collector	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	No.	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)
1	32	0.61	32	0.61	40	3.06	32	0.61	40	3.06	48	1.60
2	40	3.06	48	1.60	56	0.73	56	0.73	64	0.87	72	1.02
3	48	1.60	64	0.87	72	1.02	80	1.17	88	0.87	96	0.73
4	56	0.73	80	1.17	88	0.87	104	0.80	112	1.68	120	0.58
5	64	0.87	96	0.73	104	0.80	126	0.95	132	0.73	136	2.04
6	72	1.02	112	1.68	120	0.58	144	2.11	152	2.33	160	0.87
7	80	1.17	126	0.95	132	0.73	168	1.02	176	0.80	184	0.87
8	88	0.87	136	2.04	144	2.11	192	0.80	200	1.75	208	0.87
9	96	0.73	152	2.33	160	0.87	216	1.09	224	2.77	232	0.95
10	104	0.80	168	1.02	176	0.80	240	0.87	248	1.02	254	0.87
11	112	1.68	184	0.87	192	0.80	260	2.48	264	1.02	272	0.95
12	120	0.58	200	1.75	208	0.87	280	0.87	288	2.19	296	2.04
13	126	0.95	216	1.09	224	2.77	304	1.60	312	0.80	320	0.87
14	132	0.73	232	0.95	240	0.87	328	1.02	336	1.17	344	1.09
15	136	2.04	248	1.02	254	0.87	352	0.87	360	0.87	368	1.02
16	144	2.11	260	2.48	264	1.02	376	1.02	380	2.48	388	1.17
17	152	2.33	272	0.95	280	0.87	392	0.87	400	1.02	408	2.48
18	160	0.87	288	2.19	296	2.04	416	1.09	424	1.02	432	0.87
19	168	1.02	304	1.60	312	0.80	440	1.02	448	0.87	456	0.95
20	176	0.80	320	0.87	328	1.02	464	0.87	472	1.02	480	0.87
21	184	0.87	336	1.17	344	1.09						
22	192	0.80	352	0.87	360	0.87						
23	200	1.75	368	1.02	376	1.02						
24	208	0.87	380	2.48	388	1.17						
25	216	1.09	392	0.87	400	1.02						
26	224	2.77	408	2.48	416	1.09						
27	232	0.95	424	1.02	432	0.87						
28	240	0.87	440	1.02	448	0.87						
29	248	1.02	456	0.95	464	0.87						
30	254	0.87	472	1.02	480	0.87						
31	260	2.48										
32	264	1.02										
33	272	0.95										
34	280	0.87										
35	288	2.19										
36	296	2.04										
37	304	1.60										
38	312	0.80										
39	320	0.87										
40	328	1.02										
41	336	1.17										
42	344	1.09										
43	352	0.87										
44	360	0.87										
45	368	1.02										
46	376	1.02										
47	380	2.48										
48	388	1.17										
49	392	0.87										
50	400	1.02										
51	408	2.48										
52	416	1.09										
53	424	1.02										
54	432	0.87										
55	440	1.02										
56	448	0.87										
57	456	0.95										
58	464	0.87										
59	472	1.02										
60	480	0.87										

**Table A.9.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment II of system Circle Land and Cattle CoFI060606a(K).

Collector No.	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)
1	488	0.73	488	0.73	496	0.73	488	0.73	496	0.73	504	0.87
2	496	0.73	504	0.87	508	1.09	508	1.09	516	0.80	520	0.87
3	504	0.87	516	0.80	520	0.87	528	0.95	536	1.02	544	0.87
4	508	1.09	528	0.95	536	1.02	552	1.31	560	1.17	568	1.02
5	516	0.80	544	0.87	552	1.31	576	1.02	584	0.87	592	1.46
6	520	0.87	560	1.17	568	1.02	600	1.17	608	1.02	616	1.17
7	528	0.95	576	1.02	584	0.87	624	1.02	632	0.73	640	0.80
8	536	1.02	592	1.46	600	1.17	648	0.73	656	1.02	664	0.66
9	544	0.87	608	1.02	616	1.17	672	0.87	680	2.77	688	1.14
10	552	1.31	624	1.02	632	0.73	696	1.02	704	1.09	712	0.87
11	560	1.17	640	0.80	648	0.73	720	0.95	728	0.87	736	0.87
12	568	1.02	656	1.02	664	0.66	744	0.95	752	1.02	760	1.02
13	576	1.02	672	0.87	680	2.77	768	0.87	776	0.87	784	0.95
14	584	0.87	688	1.14	696	1.02	792	0.95	800	0.80	808	1.02
15	592	1.46	704	1.09	712	0.87	816	0.80	824	0.87	832	0.87
16	600	1.17	720	0.95	728	0.87	840	0.95	848	1.31	856	0.95
17	608	1.02	736	0.87	744	0.95	864	0.87	872	1.17	880	0.80
18	616	1.17	752	1.02	760	1.02	888	0.73	896	0.95	904	1.02
19	624	1.02	768	0.87	776	0.87	912	0.95	920	0.87	928	1.02
20	632	0.73	784	0.95	792	0.95	936	1.17	944	1.09	952	0.95
21	640	0.80	800	0.80	808	1.02						
22	648	0.73	816	0.80	824	0.87						
23	656	1.02	832	0.87	840	0.95						
24	664	0.66	848	1.31	856	0.95						
25	672	0.87	864	0.87	872	1.17						
26	680	2.77	880	0.80	888	0.73						
27	688	1.14	896	0.95	904	1.02						
28	696	1.02	912	0.95	920	0.87						
29	704	1.09	928	1.02	936	1.17						
30	712	0.87	944	1.09	952	0.95						
31	720	0.95										
32	728	0.87										
33	736	0.87										
34	744	0.95										
35	752	1.02										
36	760	1.02										
37	768	0.87										
38	776	0.87										
39	784	0.95										
40	792	0.95										
41	800	0.80										
42	808	1.02										
43	816	0.80										
44	824	0.87										
45	832	0.87										
46	840	0.95										
47	848	1.31										
48	856	0.95										
49	864	0.87										
50	872	1.17										
51	880	0.80										
52	888	0.73										
53	896	0.95										
54	904	1.02										
55	912	0.95										
56	920	0.87										
57	928	1.02										
58	936	1.17										
59	944	1.09										
60	952	0.95										

**Table A.10.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment III of system Circle Land and Cattle CoFI060606a(K).

Collector	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	radius	depth	radius	depth	radius	depth	radius	depth	radius	depth	radius	depth
No.	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)
1	888	0.73	888	0.73	896	0.95	888	0.73	896	0.95	904	1.02
2	896	0.95	904	1.02	912	0.95	912	0.95	920	0.87	928	1.02
3	904	1.02	920	0.87	928	1.02	936	1.17	944	1.09	952	0.95
4	912	0.95	936	1.17	944	1.09	960	0.73	968	0.87	976	1.02
5	920	0.87	952	0.95	960	0.73	984	1.02	992	0.73	1000	0.95
6	928	1.02	968	0.87	976	1.02	1008	2.62	1016	1.02	1024	1.17
7	936	1.17	984	1.02	992	0.73	1032	0.87	1040	0.87	1048	1.17
8	944	1.09	1000	0.95	1008	2.62	1056	3.28	1064	1.02	1072	1.02
9	952	0.95	1016	1.02	1024	1.17	1080	2.87	1088	1.17	1096	1.02
10	960	0.73	1032	0.87	1040	0.87	1104	0.73	1112	0.95	1120	2.41
11	968	0.87	1048	1.17	1056	3.28	1128	1.02	1136	0.87	1144	0.95
12	976	1.02	1064	1.02	1072	1.02	1148	0.87	1152	1.09	1160	1.09
13	984	1.02	1080	2.87	1088	1.17	1168	0.80	1176	1.17	1184	1.31
14	992	0.73	1096	1.02	1104	0.73	1192	1.17	1200	2.33	1208	1.02
15	1000	0.95	1112	0.95	1120	2.41	1216	1.02	1224	1.02	1232	0.87
16	1008	2.62	1128	1.02	1136	0.87	1240	0.87	1248	0.87	1256	1.02
17	1016	1.02	1144	0.95	1148	0.87	1264	0.95	1272	0.87	1276	0.87
18	1024	1.17	1152	1.09	1160	1.09	1280	1.02	1288	2.33	1296	1.17
19	1032	0.87	1168	0.80	1176	1.17	1304	0.80	1312	0.78	1320	0.80
20	1040	0.87	1184	1.31	1192	1.17	1344	1.12	1352	1.02	1360	0.15
21	1048	1.17	1200	2.33	1208	1.02						
22	1056	3.28	1216	1.02	1224	1.02						
23	1064	1.02	1232	0.87	1240	0.87						
24	1072	1.02	1248	0.87	1256	1.02						
25	1080	2.87	1264	0.95	1272	0.87						
26	1088	1.17	1276	0.87	1280	1.02						
27	1096	1.02	1288	2.33	1296	1.17						
28	1104	0.73	1304	0.80	1312	0.78						
29	1112	0.95	1320	0.80	1344	1.12						
30	1120	2.41	1352	1.02	1360	0.15						
31	1128	1.02										
32	1136	0.87										
33	1144	0.95										
34	1148	0.87										
35	1152	1.09										
36	1160	1.09										
37	1168	0.80										
38	1176	1.17										
39	1184	1.31										
40	1192	1.17										
41	1200	2.33										
42	1208	1.02										
43	1216	1.02										
44	1224	1.02										
45	1232	0.87										
46	1240	0.87										
47	1248	0.87										
48	1256	1.02										
49	1264	0.95										
50	1272	0.87										
51	1276	0.87										
52	1280	1.02										
53	1288	2.33										
54	1296	1.17										
55	1304	0.80										
56	1312	0.78										
57	1320	0.80										
58	1344	1.12										
59	1352	1.02										
60	1360	0.15										

**Table A.11.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment I of system Finney FI 5-26-05.

Collector	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	No.	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)
1	266	1.39	266	1.39	270	1.46	266	1.39	270	1.46	274	1.02
2	270	1.46	274	1.02	278	0.78	278	0.78	282	0.95	286	0.87
3	274	1.02	282	0.95	286	0.87	290	0.73	294	0.95	298	0.87
4	278	0.78	290	0.73	294	0.95	302	0.70	306	0.87	310	0.73
5	282	0.95	298	0.87	302	0.70	314	0.73	318	0.83	322	0.73
6	286	0.87	306	0.87	310	0.73	326	0.73	330	0.97	334	0.66
7	290	0.73	314	0.73	318	0.83	338	0.75	342	0.66	346	0.66
8	294	0.95	322	0.73	326	0.73	350	0.66	354	0.51	358	1.02
9	298	0.87	330	0.97	334	0.66	362	0.51	366	0.56	370	0.73
10	302	0.70	338	0.75	342	0.66	374	0.80	378	1.09	382	0.87
11	306	0.87	346	0.66	350	0.66	386	0.68	390	1.02	394	0.95
12	310	0.73	354	0.51	358	1.02	398	0.87	402	0.73	406	1.75
13	314	0.73	362	0.51	366	0.56	410	0.80	414	0.66	418	0.58
14	318	0.83	370	0.73	374	0.80	422	0.87	426	0.80	430	0.95
15	322	0.73	378	1.09	382	0.87	434	0.87	438	0.73	442	0.87
16	326	0.73	386	0.68	390	1.02	446	2.11	450	0.58	454	1.82
17	330	0.97	394	0.95	398	0.87	458	0.87	462	0.73	466	0.95
18	334	0.66	402	0.73	406	1.75	470	0.80	474	0.66	478	0.87
19	338	0.75	410	0.80	414	0.66	482	0.95	486	0.66	490	1.75
20	342	0.66	418	0.58	422	0.87	494	0.44	498	1.02	502	0.87
21	346	0.66	426	0.80	430	0.95						
22	350	0.66	434	0.87	438	0.73						
23	354	0.51	442	0.87	446	2.11						
24	358	1.02	450	0.58	454	1.82						
25	362	0.51	458	0.87	462	0.73						
26	366	0.56	466	0.95	470	0.80						
27	370	0.73	474	0.66	478	0.87						
28	374	0.80	482	0.95	486	0.66						
29	378	1.09	490	1.75	494	0.44						
30	382	0.87	498	1.02	502	0.87						
31	386	0.68										
32	390	1.02										
33	394	0.95										
34	398	0.87										
35	402	0.73										
36	406	1.75										
37	410	0.80										
38	414	0.66										
39	418	0.58										
40	422	0.87										
41	426	0.80										
42	430	0.95										
43	434	0.87										
44	438	0.73										
45	442	0.87										
46	446	2.11										
47	450	0.58										
48	454	1.82										
49	458	0.87										
50	462	0.73										
51	466	0.95										
52	470	0.80										
53	474	0.66										
54	478	0.87										
55	482	0.95										
56	486	0.66										
57	490	1.75										
58	494	0.44										
59	498	1.02										
60	502	0.87										

**Table A.12.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment II of system Finney FI 5-26-05.

Collector	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
No.	radius	depth	radius	depth	radius	depth	radius	depth	radius	depth	radius	depth
	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)
1	506	0.80	506	0.80	510	0.80	506	0.80	510	0.80	514	1.24
2	510	0.80	514	1.24	518	0.66	518	0.66	522	0.95	526	1.31
3	514	1.24	522	0.95	526	1.31	530	1.24	534	0.51	538	0.66
4	518	0.66	530	1.24	534	0.51	542	0.73	546	1.60	550	0.73
5	522	0.95	538	0.66	542	0.73	554	0.73	558	0.58	562	0.66
6	526	1.31	546	1.60	550	0.73	566	0.80	570	0.87	574	0.95
7	530	1.24	554	0.73	558	0.58	578	0.80	582	1.31	586	0.87
8	534	0.51	562	0.66	566	0.80	590	1.02	594	1.31	598	1.17
9	538	0.66	570	0.87	574	0.95	602	0.73	606	0.80	610	0.95
10	542	0.73	578	0.80	582	1.31	614	0.51	618	0.87	622	0.80
11	546	1.60	586	0.87	590	1.02	626	1.53	630	3.06	634	0.80
12	550	0.73	594	1.31	598	1.17	638	1.17	642	1.09	646	1.09
13	554	0.73	602	0.73	606	0.80	650	0.66	654	0.29	658	0.87
14	558	0.58	610	0.95	614	0.51	662	0.87	666	0.87	670	1.02
15	562	0.66	618	0.87	622	0.80	674	1.02	678	1.02	682	0.87
16	566	0.80	626	1.53	630	3.06	686	0.73	690	1.24	694	1.53
17	570	0.87	634	0.80	638	1.17	698	0.87	702	1.17	706	0.51
18	574	0.95	642	1.09	646	1.09	710	0.80	714	0.66	718	0.44
19	578	0.80	650	0.66	654	0.29	722	1.39	726	1.09	730	0.95
20	582	1.31	658	0.87	662	0.87	734	0.73	738	1.09	742	0.87
21	586	0.87	666	0.87	670	1.02						
22	590	1.02	674	1.02	678	1.02						
23	594	1.31	682	0.87	686	0.73						
24	598	1.17	690	1.24	694	1.53						
25	602	0.73	698	0.87	702	1.17						
26	606	0.80	706	0.51	710	0.80						
27	610	0.95	714	0.66	718	0.44						
28	614	0.51	722	1.39	726	1.09						
29	618	0.87	730	0.95	734	0.73						
30	622	0.80	738	1.09	742	0.87						
31	626	1.53										
32	630	3.06										
33	634	0.80										
34	638	1.17										
35	642	1.09										
36	646	1.09										
37	650	0.66										
38	654	0.29										
39	658	0.87										
40	662	0.87										
41	666	0.87										
42	670	1.02										
43	674	1.02										
44	678	1.02										
45	682	0.87										
46	686	0.73										
47	690	1.24										
48	694	1.53										
49	698	0.87										
50	702	1.17										
51	706	0.51										
52	710	0.80										
53	714	0.66										
54	718	0.44										
55	722	1.39										
56	726	1.09										
57	730	0.95										
58	734	0.73										
59	738	1.09										
60	742	0.87										



**Table A.13.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment III of system Finney FI 5-26-05.

Collector	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
No.	radius	depth	radius	depth	radius	depth	radius	depth	radius	depth	radius	depth
	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)
1	746	1.68	746	1.68	750	1.02	746	1.68	750	1.02	754	2.33
2	750	1.02	754	2.33	758	1.17	758	1.17	762	1.02	766	1.09
3	754	2.33	762	1.02	766	1.09	770	1.17	774	1.24	778	0.95
4	758	1.17	770	1.17	774	1.24	782	1.39	786	0.58	790	1.17
5	762	1.02	778	0.95	782	1.39	794	0.95	798	1.09	802	1.31
6	766	1.09	786	0.58	790	1.17	806	1.02	810	1.02	814	1.31
7	770	1.17	794	0.95	798	1.09	818	0.80	822	0.66	826	1.46
8	774	1.24	802	1.31	806	1.02	830	1.75	834	0.73	838	0.80
9	778	0.95	810	1.02	814	1.31	842	1.09	846	0.73	850	0.87
10	782	1.39	818	0.80	822	0.66	854	0.58	858	0.73	862	0.73
11	786	0.58	826	1.46	830	1.75	866	0.51	870	0.80	874	0.80
12	790	1.17	834	0.73	838	0.80	878	1.31	882	0.95	886	0.80
13	794	0.95	842	1.09	846	0.73	890	1.39	894	0.73	898	0.66
14	798	1.09	850	0.87	854	0.58	902	0.73	906	1.09	910	0.87
15	802	1.31	858	0.73	862	0.73	914	1.09	918	1.24	922	0.80
16	806	1.02	866	0.51	870	0.80	926	1.02	930	0.73	934	1.09
17	810	1.02	874	0.80	878	1.31	938	0.66	942	0.80	946	2.62
18	814	1.31	882	0.95	886	0.80	950	0.58	954	0.87	958	1.02
19	818	0.80	890	1.39	894	0.73	962	0.95	966	0.58	970	0.80
20	822	0.66	898	0.66	902	0.73	974	0.87	978	1.17	982	1.60
21	826	1.46	906	1.09	910	0.87						
22	830	1.75	914	1.09	918	1.24						
23	834	0.73	922	0.80	926	1.02						
24	838	0.80	930	0.73	934	1.09						
25	842	1.09	938	0.66	942	0.80						
26	846	0.73	946	2.62	950	0.58						
27	850	0.87	954	0.87	958	1.02						
28	854	0.58	962	0.95	966	0.58						
29	858	0.73	970	0.80	974	0.87						
30	862	0.73	978	1.17	982	1.60						
31	866	0.51										
32	870	0.80										
33	874	0.80										
34	878	1.31										
35	882	0.95										
36	886	0.80										
37	890	1.39										
38	894	0.73										
39	898	0.66										
40	902	0.73										
41	906	1.09										
42	910	0.87										
43	914	1.09										
44	918	1.24										
45	922	0.80										
46	926	1.02										
47	930	0.73										
48	934	1.09										
49	938	0.66										
50	942	0.80										
51	946	2.62										
52	950	0.58										
53	954	0.87										
54	958	1.02										
55	962	0.95										
56	966	0.58										
57	970	0.80										
58	974	0.87										
59	978	1.17										
60	982	1.60										

**Table A.14.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment IV of system Finney FI 5-26-05.

Collector No.	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)
1	986	1.97	986	1.97	990	0.66	986	1.97	990	0.66	994	1.31
2	990	0.66	994	1.31	998	1.17	998	1.17	1002	0.95	1006	0.80
3	994	1.31	1002	0.95	1006	0.80	1010	0.66	1014	1.39	1018	1.46
4	998	1.17	1010	0.66	1014	1.39	1022	0.51	1026	0.73	1030	1.02
5	1002	0.95	1018	1.46	1022	0.51	1034	1.02	1038	0.73	1042	1.60
6	1006	0.80	1026	0.73	1030	1.02	1046	0.95	1050	1.39	1054	0.58
7	1010	0.66	1034	1.02	1038	0.73	1058	0.51	1062	0.80	1066	0.80
8	1014	1.39	1042	1.60	1046	0.95	1070	0.95	1074	1.39	1078	0.80
9	1018	1.46	1050	1.39	1054	0.58	1082	1.09	1086	0.66	1090	1.02
10	1022	0.51	1058	0.51	1062	0.80	1094	0.66	1098	0.66	1102	0.90
11	1026	0.73	1066	0.80	1070	0.95	1106	1.24	1110	0.73	1114	1.21
12	1030	1.02	1074	1.39	1078	0.80	1118	0.80	1122	1.09	1126	1.43
13	1034	1.02	1082	1.09	1086	0.66	1130	0.73	1134	0.87	1138	0.95
14	1038	0.73	1090	1.02	1094	0.66	1142	1.24	1146	0.51	1150	0.80
15	1042	1.60	1098	0.66	1102	0.90	1154	1.02	1158	1.39	1162	1.41
16	1046	0.95	1106	1.24	1110	0.73	1166	0.87	1170	0.73	1174	0.66
17	1050	1.39	1114	1.21	1118	0.80	1178	1.19	1182	0.78	1186	0.51
18	1054	0.58	1122	1.09	1126	1.43	1190	0.80	1194	0.87	1198	0.80
19	1058	0.51	1130	0.73	1134	0.87	1202	0.95	1206	1.14	1210	0.80
20	1062	0.80	1138	0.95	1142	1.24	1214	1.34	1218	1.24	1222	1.14
21	1066	0.80	1146	0.51	1150	0.80						
22	1070	0.95	1154	1.02	1158	1.39						
23	1074	1.39	1162	1.41	1166	0.87						
24	1078	0.80	1170	0.73	1174	0.66						
25	1082	1.09	1178	1.19	1182	0.78						
26	1086	0.66	1186	0.51	1190	0.80						
27	1090	1.02	1194	0.87	1198	0.80						
28	1094	0.66	1202	0.95	1206	1.14						
29	1098	0.66	1210	0.80	1214	1.34						
30	1102	0.90	1218	1.24	1222	1.14						
31	1106	1.24										
32	1110	0.73										
33	1114	1.21										
34	1118	0.80										
35	1122	1.09										
36	1126	1.43										
37	1130	0.73										
38	1134	0.87										
39	1138	0.95										
40	1142	1.24										
41	1146	0.51										
42	1150	0.80										
43	1154	1.02										
44	1158	1.39										
45	1162	1.41										
46	1166	0.87										
47	1170	0.73										
48	1174	0.66										
49	1178	1.19										
50	1182	0.78										
51	1186	0.51										
52	1190	0.80										
53	1194	0.87										
54	1198	0.80										
55	1202	0.95										
56	1206	1.14										
57	1210	0.80										
58	1214	1.34										
59	1218	1.24										
60	1222	1.14										

**Table A.15.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment I of system Finney-R.75appFI071905b.

Collector No.	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)
1	50	1.34	50	1.34	58	1.09	50	1.34	58	1.09	66	1.09
2	58	1.09	66	1.09	74	0.85	74	0.85	82	1.02	90	1.02
3	66	1.09	82	1.02	90	1.02	98	1.24	106	0.87	114	2.48
4	74	0.85	98	1.24	106	0.87	122	0.87	130	0.73	138	0.80
5	82	1.02	114	2.48	122	0.87	146	2.66	154	2.11	162	2.19
6	90	1.02	130	0.73	138	0.80	170	1.75	178	0.73	186	1.21
7	98	1.24	146	2.66	154	2.11	194	0.95	202	0.87	210	0.78
8	106	0.87	162	2.19	170	1.75	218	0.78	226	1.02	234	0.87
9	114	2.48	178	0.73	186	1.21	242	1.02	250	1.07	258	0.80
10	122	0.87	194	0.95	202	0.87	266	0.83	274	0.95	282	1.04
11	130	0.73	210	0.78	218	0.78	290	1.02	298	0.87	306	0.92
12	138	0.80	226	1.02	234	0.87	314	0.63	322	0.87	330	1.17
13	146	2.66	242	1.02	250	1.07	338	0.58	346	1.17	354	1.09
14	154	2.11	258	0.80	266	0.83	362	0.66	370	1.04	378	1.02
15	162	2.19	274	0.95	282	1.04	386	1.12	394	2.58	402	0.85
16	170	1.75	290	1.02	298	0.87	410	0.87	418	0.95	426	1.02
17	178	0.73	306	0.92	314	0.63	434	0.95	442	0.87	450	1.97
18	186	1.21	322	0.87	330	1.17	458	1.17	466	2.50	474	0.87
19	194	0.95	338	0.58	346	1.17	482	0.70	490	0.95	498	1.34
20	202	0.87	354	1.09	362	0.66	506	1.53	514	0.85	522	0.73
21	210	0.78	370	1.04	378	1.02						
22	218	0.78	386	1.12	394	2.58						
23	226	1.02	402	0.85	410	0.87						
24	234	0.87	418	0.95	426	1.02						
25	242	1.02	434	0.95	442	0.87						
26	250	1.07	450	1.97	458	1.17						
27	258	0.80	466	2.50	474	0.87						
28	266	0.83	482	0.70	490	0.95						
29	274	0.95	498	1.34	506	1.53						
30	282	1.04	514	0.85	522	0.73						
31	290	1.02										
32	298	0.87										
33	306	0.92										
34	314	0.63										
35	322	0.87										
36	330	1.17										
37	338	0.58										
38	346	1.17										
39	354	1.09										
40	362	0.66										
41	370	1.04										
42	378	1.02										
43	386	1.12										
44	394	2.58										
45	402	0.85										
46	410	0.87										
47	418	0.95										
48	426	1.02										
49	434	0.95										
50	442	0.87										
51	450	1.97										
52	458	1.17										
53	466	2.50										
54	474	0.87										
55	482	0.70										
56	490	0.95										
57	498	1.34										
58	506	1.53										
59	514	0.85										
60	522	0.73										

**Table A.16.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment II of system Finney-R.75appFI071905b.

Collector No.	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)
1	530	0.87	530	0.87	538	0.97	530	0.87	538	0.97	546	1.17
2	538	0.97	546	1.17	554	1.07	554	1.07	562	0.95	570	0.78
3	546	1.17	562	0.95	570	0.78	578	1.34	586	1.31	594	0.92
4	554	1.07	578	1.34	586	1.31	602	0.95	610	0.73	618	0.05
5	562	0.95	594	0.92	602	0.95	626	0.97	634	1.24	642	0.87
6	570	0.78	610	0.73	618	0.05	650	1.17	658	0.73	666	0.87
7	578	1.34	626	0.97	634	1.24	674	1.00	682	1.36	690	1.17
8	586	1.31	642	0.87	650	1.17	698	0.80	706	1.07	714	1.39
9	594	0.92	658	0.73	666	0.87	722	1.26	730	0.87	738	0.68
10	602	0.95	674	1.00	682	1.36	746	1.39	754	1.17	762	0.97
11	610	0.73	690	1.17	698	0.80	770	0.92	778	1.56	786	1.17
12	618	0.05	706	1.07	714	1.39	794	1.46	802	1.24	810	1.09
13	626	0.97	722	1.26	730	0.87	818	0.63	826	0.85	834	1.39
14	634	1.24	738	0.68	746	1.39	842	1.90	850	1.21	858	0.78
15	642	0.87	754	1.17	762	0.97	866	0.90	874	1.48	882	0.97
16	650	1.17	770	0.92	778	1.56	890	1.07	898	1.09	906	0.95
17	658	0.73	786	1.17	794	1.46	914	1.41	922	1.39	930	1.53
18	666	0.87	802	1.24	810	1.09	938	1.82	946	1.04	954	0.97
19	674	1.00	818	0.63	826	0.85	962	1.51	970	1.82	978	1.09
20	682	1.36	834	1.39	842	1.90	986	0.95	994	1.09	1002	1.60
21	690	1.17	850	1.21	858	0.78						
22	698	0.80	866	0.90	874	1.48						
23	706	1.07	882	0.97	890	1.07						
24	714	1.39	898	1.09	906	0.95						
25	722	1.26	914	1.41	922	1.39						
26	730	0.87	930	1.53	938	1.82						
27	738	0.68	946	1.04	954	0.97						
28	746	1.39	962	1.51	970	1.82						
29	754	1.17	978	1.09	986	0.95						
30	762	0.97	994	1.09	1002	1.60						
31	770	0.92										
32	778	1.56										
33	786	1.17										
34	794	1.46										
35	802	1.24										
36	810	1.09										
37	818	0.63										
38	826	0.85										
39	834	1.39										
40	842	1.90										
41	850	1.21										
42	858	0.78										
43	866	0.90										
44	874	1.48										
45	882	0.97										
46	890	1.07										
47	898	1.09										
48	906	0.95										
49	914	1.41										
50	922	1.39										
51	930	1.53										
52	938	1.82										
53	946	1.04										
54	954	0.97										
55	962	1.51										
56	970	1.82										
57	978	1.09										
58	986	0.95										
59	994	1.09										
60	1002	1.60										

**Table A.17.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment I of system Finney FI 4-16-02.

Collector No.	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)
1	16	2.27	16	2.27	32	1.02	16	2.27	32	1.02	48	0.78
2	32	1.02	48	0.78	64	0.40	64	0.40	80	0.52	96	0.34
3	48	0.78	80	0.52	96	0.34	112	0.56	128	0.54	144	2.25
4	64	0.40	112	0.56	128	0.54	160	0.62	176	0.67	192	0.45
5	80	0.52	144	2.25	160	0.62	208	0.40	224	0.12	240	0.10
6	96	0.34	176	0.67	192	0.45	256	3.41	272	0.61	288	0.43
7	112	0.56	208	0.40	224	0.12	304	0.51	320	0.47	336	0.39
8	128	0.54	240	0.10	256	3.41	352	0.56	368	0.84	384	1.34
9	144	2.25	272	0.61	288	0.43	392	0.56	408	0.84	424	0.67
10	160	0.62	304	0.51	320	0.47	432	0.71	440	0.93	448	0.73
11	176	0.67	336	0.39	352	0.56	456	0.68	464	1.02	472	0.57
12	192	0.45	368	0.84	384	1.34	480	0.68	488	0.99	496	0.73
13	208	0.40	392	0.56	408	0.84	504	1.10	512	0.92	520	0.77
14	224	0.12	424	0.67	432	0.71	528	0.78	536	0.78	544	0.90
15	240	0.10	440	0.93	448	0.73	552	0.83	560	0.79	568	0.90
16	256	3.41	456	0.68	464	1.02	576	0.93	584	0.83	592	0.59
17	272	0.61	472	0.57	480	0.68	600	0.68	608	0.87	616	0.72
18	288	0.43	488	0.99	496	0.73	624	0.68	632	1.08	640	1.05
19	304	0.51	504	1.10	512	0.92	648	0.62	656	0.78	664	0.72
20	320	0.47	520	0.77	528	0.78	672	0.82	680	0.87	688	0.97
21	336	0.39	536	0.78	544	0.90						
22	352	0.56	552	0.83	560	0.79						
23	368	0.84	568	0.90	576	0.93						
24	384	1.34	584	0.83	592	0.59						
25	392	0.56	600	0.68	608	0.87						
26	408	0.84	616	0.72	624	0.68						
27	424	0.67	632	1.08	640	1.05						
28	432	0.71	648	0.62	656	0.78						
29	440	0.93	664	0.72	672	0.82						
30	448	0.73	680	0.87	688	0.97						
31	456	0.68										
32	464	1.02										
33	472	0.57										
34	480	0.68										
35	488	0.99										
36	496	0.73										
37	504	1.10										
38	512	0.92										
39	520	0.77										
40	528	0.78										
41	536	0.78										
42	544	0.90										
43	552	0.83										
44	560	0.79										
45	568	0.90										
46	576	0.93										
47	584	0.83										
48	592	0.59										
49	600	0.68										
50	608	0.87										
51	616	0.72										
52	624	0.68										
53	632	1.08										
54	640	1.05										
55	648	0.62										
56	656	0.78										
57	664	0.72										
58	672	0.82										
59	680	0.87										
60	688.00	0.97										

**Table A.18.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment II of system Finney FI 4-16-02.

Collector No.	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)
1	696	0.71	696	0.71	704	0.92	696	0.71	704	0.92	712	0.68
2	704	0.92	712	0.68	720	1.10	720	1.10	728	0.62	736	1.12
3	712	0.68	728	0.62	736	1.12	744	2.46	752	0.98	760	1.44
4	720	1.10	744	2.46	752	0.98	768	1.43	776	0.88	784	0.73
5	728	0.62	760	1.44	768	1.43	792	0.55	800	0.83	808	0.73
6	736	1.12	776	0.88	784	0.73	816	0.87	824	0.83	832	0.62
7	744	2.46	792	0.55	800	0.83	840	0.70	848	0.94	856	0.65
8	752	0.98	808	0.73	816	0.87	864	0.70	872	0.75	880	0.94
9	760	1.44	824	0.83	832	0.62	888	1.11	896	0.65	904	0.89
10	768	1.43	840	0.70	848	0.94	912	0.84	920	0.80	928	0.59
11	776	0.88	856	0.65	864	0.70	936	0.87	944	0.99	952	0.73
12	784	0.73	872	0.75	880	0.94	960	0.91	968	0.72	976	0.78
13	792	0.55	888	1.11	896	0.65	984	0.95	992	0.74	1000	0.51
14	800	0.83	904	0.89	912	0.84	1008	1.00	1016	0.90	1024	1.24
15	808	0.73	920	0.80	928	0.59	1032	0.75	1040	0.75	1048	0.83
16	816	0.87	936	0.87	944	0.99	1056	0.77	1064	0.81	1072	0.96
17	824	0.83	952	0.73	960	0.91	1080	0.85	1088	0.90	1096	0.66
18	832	0.62	968	0.72	976	0.78	1104	0.77	1112	0.86	1120	1.10
19	840	0.70	984	0.95	992	0.74	1128	0.81	1136	0.90	1144	0.94
20	848	0.94	1000	0.51	1008	1.00	1152	0.97	1160	0.82	1168	0.71
21	856	0.65	1016	0.90	1024	1.24						
22	864	0.70	1032	0.75	1040	0.75						
23	872	0.75	1048	0.83	1056	0.77						
24	880	0.94	1064	0.81	1072	0.96						
25	888	1.11	1080	0.85	1088	0.90						
26	896	0.65	1096	0.66	1104	0.77						
27	904	0.89	1112	0.86	1120	1.10						
28	912	0.84	1128	0.81	1136	0.90						
29	920	0.80	1144	0.94	1152	0.97						
30	928	0.59	1160	0.82	1168	0.71						
31	936	0.87										
32	944	0.99										
33	952	0.73										
34	960	0.91										
35	968	0.72										
36	976	0.78										
37	984	0.95										
38	992	0.74										
39	1000	0.51										
40	1008	1.00										
41	1016	0.90										
42	1024	1.24										
43	1032	0.75										
44	1040	0.75										
45	1048	0.83										
46	1056	0.77										
47	1064	0.81										
48	1072	0.96										
49	1080	0.85										
50	1088	0.90										
51	1096	0.66										
52	1104	0.77										
53	1112	0.86										
54	1120	1.10										
55	1128	0.81										
56	1136	0.90										
57	1144	0.94										
58	1152	0.97										
59	1160	0.82										
60	1168	0.71										

**Table A.19.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment I of system Finney Rome Farms FI 6-14-06.

Collector No.	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)
1	24	0.36	24	0.36	32	0.87	24	0.36	32	0.87	40	1.46
2	32	0.87	40	1.46	48	0.80	48	0.80	56	3.23	64	0.58
3	40	1.46	56	3.23	64	0.58	72	0.49	80	0.58	88	0.66
4	48	0.80	72	0.49	80	0.58	96	0.58	104	0.44	112	0.51
5	56	3.23	88	0.66	96	0.58	120	0.51	128	0.44	136	0.58
6	64	0.58	104	0.44	112	0.51	144	0.58	152	0.58	160	0.58
7	72	0.49	120	0.51	128	0.44	168	0.44	176	0.87	184	0.51
8	80	0.58	136	0.58	144	0.58	192	0.73	200	0.73	208	0.51
9	88	0.66	152	0.58	160	0.58	216	0.44	224	1.60	232	0.58
10	96	0.58	168	0.44	176	0.87	240	0.58	248	1.46	256	0.58
11	104	0.44	184	0.51	192	0.73	264	0.58	272	0.58	280	0.66
12	112	0.51	200	0.73	208	0.51	288	0.58	296	0.58	304	0.58
13	120	0.51	216	0.44	224	1.60	312	0.51	316	0.44	322	0.58
14	128	0.44	232	0.58	240	0.58	328	0.73	336	0.58	344	0.58
15	136	0.58	248	1.46	256	0.58	352	0.66	360	0.87	368	0.66
16	144	0.58	264	0.58	272	0.58	376	0.66	384	0.73	392	0.73
17	152	0.58	280	0.66	288	0.58	400	0.73	408	0.66	416	0.51
18	160	0.58	296	0.58	304	0.58	424	0.66	432	0.58	440	0.73
19	168	0.44	312	0.51	316	0.44	448	0.66	456	0.66	464	0.73
20	176	0.87	322	0.58	328	0.73	472	0.58	478	0.66	482	1.60
21	184	0.51	336	0.58	344	0.58						
22	192	0.73	352	0.66	360	0.87						
23	200	0.73	368	0.66	376	0.66						
24	208	0.51	384	0.73	392	0.73						
25	216	0.44	400	0.73	408	0.66						
26	224	1.60	416	0.51	424	0.66						
27	232	0.58	432	0.58	440	0.73						
28	240	0.58	448	0.66	456	0.66						
29	248	1.46	464	0.73	472	0.58						
30	256	0.58	478	0.66	482	1.60						
31	264	0.58										
32	272	0.58										
33	280	0.66										
34	288	0.58										
35	296	0.58										
36	304	0.58										
37	312	0.51										
38	316	0.44										
39	322	0.58										
40	328	0.73										
41	336	0.58										
42	344	0.58										
43	352	0.66										
44	360	0.87										
45	368	0.66										
46	376	0.66										
47	384	0.73										
48	392	0.73										
49	400	0.73										
50	408	0.66										
51	416	0.51										
52	424	0.66										
53	432	0.58										
54	440	0.73										
55	448	0.66										
56	456	0.66										
57	464	0.73										
58	472	0.58										
59	478	0.66										
60	482	1.60										

**Table A.20.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment II of system Finney Rome Farms FI 6-14-06.

Collector No.	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)
1	488	0.58	488	0.58	496	0.73	488	0.58	496	0.73	504	0.73
2	496	0.73	504	0.73	512	0.66	512	0.66	520	2.48	528	0.66
3	504	0.73	520	2.48	528	0.66	536	0.66	544	0.66	552	0.73
4	512	0.66	536	0.66	544	0.66	560	0.73	568	0.73	576	0.73
5	520	2.48	552	0.73	560	0.73	584	0.58	592	0.73	600	0.80
6	528	0.66	568	0.73	576	0.73	608	0.15	616	0.73	624	0.58
7	536	0.66	584	0.58	592	0.73	632	0.66	638	0.66	642	0.73
8	544	0.66	600	0.80	608	0.15	648	0.51	656	0.73	664	0.73
9	552	0.73	616	0.73	624	0.58	672	0.73	680	2.33	688	0.80
10	560	0.73	632	0.66	638	0.66	696	1.17	704	0.73	712	0.73
11	568	0.73	642	0.73	648	0.51	720	0.73	728	0.73	736	0.66
12	576	0.73	656	0.73	664	0.73	744	0.80	752	0.80	760	0.66
13	584	0.58	672	0.73	680	2.33	768	0.66	770	0.80	784	0.73
14	592	0.73	688	0.80	696	1.17	792	0.73	798	0.58	804	1.02
15	600	0.80	704	0.73	712	0.73	808	0.66	816	0.66	824	0.73
16	608	0.15	720	0.73	728	0.73	832	0.87	840	0.80	848	0.87
17	616	0.73	736	0.66	744	0.80	856	2.92	864	0.80	872	0.73
18	624	0.58	752	0.80	760	0.66	880	0.87	888	0.73	896	0.73
19	632	0.66	768	0.66	770	0.80	904	0.73	912	0.73	920	1.31
20	638	0.66	784	0.73	792	0.73	928	0.73	936	1.17	944	2.11
21	642	0.73	798	0.58	804	1.02						
22	648	0.51	808	0.66	816	0.66						
23	656	0.73	824	0.73	832	0.87						
24	664	0.73	840	0.80	848	0.87						
25	672	0.73	856	2.92	864	0.80						
26	680	2.33	872	0.73	880	0.87						
27	688	0.80	888	0.73	896	0.73						
28	696	1.17	904	0.73	912	0.73						
29	704	0.73	920	1.31	928	0.73						
30	712	0.73	936	1.17	944	2.11						
31	720	0.73										
32	728	0.73										
33	736	0.66										
34	744	0.80										
35	752	0.80										
36	760	0.66										
37	768	0.66										
38	770	0.80										
39	784	0.73										
40	792	0.73										
41	798	0.58										
42	804	1.02										
43	808	0.66										
44	816	0.66										
45	824	0.73										
46	832	0.87										
47	840	0.80										
48	848	0.87										
49	856	2.92										
50	864	0.80										
51	872	0.73										
52	880	0.87										
53	888	0.73										
54	896	0.73										
55	904	0.73										
56	912	0.73										
57	920	1.31										
58	928	0.73										
59	936	1.17										
60	944	2.11										



**Table A.21.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment I of system Finney FI 041706a.

Collector	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
No.	radius	depth	radius	depth	radius	depth	radius	depth	radius	depth	radius	depth
	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)
1	12	0.44	12	0.44	16	0.66	12	0.44	16	0.66	20	1.82
2	16	0.66	20	1.82	24	2.55	24	2.55	28	1.17	32	1.43
3	20	1.82	28	1.17	32	1.43	36	0.68	40	1.17	44	0.70
4	24	2.55	36	0.68	40	1.17	48	1.60	52	1.17	56	1.12
5	28	1.17	44	0.70	48	1.60	60	3.09	64	1.24	68	1.09
6	32	1.43	52	1.17	56	1.12	72	0.95	76	0.95	80	0.92
7	36	0.68	60	3.09	64	1.24	84	0.61	88	0.66	92	0.66
8	40	1.17	68	1.09	72	0.95	96	0.53	100	0.63	104	0.78
9	44	0.70	76	0.95	80	0.92	108	0.80	112	0.78	116	0.66
10	48	1.60	84	0.61	88	0.66	120	0.73	124	0.66	128	1.36
11	52	1.17	92	0.66	96	0.53	132	0.66	136	0.73	140	0.66
12	56	1.12	100	0.63	104	0.78	144	0.66	148	1.39	152	0.70
13	60	3.09	108	0.80	112	0.78	156	0.78	160	0.75	164	0.80
14	64	1.24	116	0.66	120	0.73	168	0.78	172	0.73	176	0.63
15	68	1.09	124	0.66	128	1.36	180	0.80	182	0.61	184	0.66
16	72	0.95	132	0.66	136	0.73	188	0.78	190	0.73	192	0.70
17	76	0.95	140	0.66	144	0.66	196	0.92	200	0.66	204	0.63
18	80	0.92	148	1.39	152	0.70	208	0.68	212	0.83	216	1.75
19	84	0.61	156	0.78	160	0.75	220	0.90	224	0.73	228	0.70
20	88	0.66	164	0.80	168	0.78	232	0.70	236	0.73	240	1.09
21	92	0.66	172	0.73	176	0.63						
22	96	0.53	180	0.80	182	0.61						
23	100	0.63	184	0.66	188	0.78						
24	104	0.78	190	0.73	192	0.70						
25	108	0.80	196	0.92	200	0.66						
26	112	0.78	204	0.63	208	0.68						
27	116	0.66	212	0.83	216	1.75						
28	120	0.73	220	0.90	224	0.73						
29	124	0.66	228	0.70	232	0.70						
30	128	1.36	236	0.73	240	1.09						
31	132	0.66										
32	136	0.73										
33	140	0.66										
34	144	0.66										
35	148	1.39										
36	152	0.70										
37	156	0.78										
38	160	0.75										
39	164	0.80										
40	168	0.78										
41	172	0.73										
42	176	0.63										
43	180	0.80										
44	182	0.61										
45	184	0.66										
46	188	0.78										
47	190	0.73										
48	192	0.70										
49	196	0.92										
50	200	0.66										
51	204	0.63										
52	208	0.68										
53	212	0.83										
54	216	1.75										
55	220	0.90										
56	224	0.73										
57	228	0.70										
58	232	0.70										
59	236	0.73										
60	240	1.09										

**Table A.22.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment II of system Finney FI 041706a.

Collector No.	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)
1	244	0.80	244	0.80	248	0.68	244	0.80	248	0.68	252	0.63
2	248	0.68	252	0.63	256	0.92	256	0.92	260	0.73	264	0.73
3	252	0.63	260	0.73	264	0.73	268	0.66	272	0.63	276	0.63
4	256	0.92	268	0.66	272	0.63	280	0.80	284	0.78	288	0.95
5	260	0.73	276	0.63	280	0.80	292	0.85	296	0.87	300	0.78
6	264	0.73	284	0.78	288	0.95	304	0.68	308	0.78	312	0.73
7	268	0.66	292	0.85	296	0.87	316	0.73	320	0.80	324	0.80
8	272	0.63	300	0.78	304	0.68	328	1.31	332	0.87	336	0.80
9	276	0.63	308	0.78	312	0.73	340	0.80	344	0.92	348	0.80
10	280	0.80	316	0.73	320	0.80	352	0.87	356	0.75	360	0.78
11	284	0.78	324	0.80	328	1.31	364	0.73	368	0.73	370	0.66
12	288	0.95	332	0.87	336	0.80	372	1.19	374	0.73	376	0.95
13	292	0.85	340	0.80	344	0.92	378	1.48	382	0.95	386	0.87
14	296	0.87	348	0.80	352	0.87	390	1.07	394	1.90	398	1.17
15	300	0.78	356	0.75	360	0.78	402	1.09	406	0.95	410	1.53
16	304	0.68	364	0.73	368	0.73	414	1.00	418	1.17	422	1.17
17	308	0.78	370	0.66	372	1.19	426	0.87	430	0.78	434	1.19
18	312	0.73	374	0.73	376	0.95	438	0.95	442	1.17	446	0.95
19	316	0.73	378	1.48	382	0.95	450	0.51	454	1.51	458	0.97
20	320	0.80	386	0.87	390	1.07	462	1.09	466	0.66	470	1.48
21	324	0.80	394	1.90	398	1.17						
22	328	1.31	402	1.09	406	0.95						
23	332	0.87	410	1.53	414	1.00						
24	336	0.80	418	1.17	422	1.17						
25	340	0.80	426	0.87	430	0.78						
26	344	0.92	434	1.19	438	0.95						
27	348	0.80	442	1.17	446	0.95						
28	352	0.87	450	0.51	454	1.51						
29	356	0.75	458	0.97	462	1.09						
30	360	0.78	466	0.66	470	1.48						
31	364	0.73										
32	368	0.73										
33	370	0.66										
34	372	1.19										
35	374	0.73										
36	376	0.95										
37	378	1.48										
38	382	0.95										
39	386	0.87										
40	390	1.07										
41	394	1.90										
42	398	1.17										
43	402	1.09										
44	406	0.95										
45	410	1.53										
46	414	1.00										
47	418	1.17										
48	422	1.17										
49	426	0.87										
50	430	0.78										
51	434	1.19										
52	438	0.95										
53	442	1.17										
54	446	0.95										
55	450	0.51										
56	454	1.51										
57	458	0.97										
58	462	1.09										
59	466	0.66										
60	470	1.48										

**Table A.23.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment III of system Finney FI 041706a.

Collector No.	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)
1	474	1.09	474	1.09	478	1.12	474	1.09	478	1.12	482	1.29
2	478	1.12	482	1.29	486	0.75	486	0.75	490	1.68	494	1.31
3	482	1.29	490	1.68	494	1.31	498	0.92	502	2.09	506	1.29
4	486	0.75	498	0.92	502	2.09	510	0.80	514	1.09	518	1.24
5	490	1.68	506	1.29	510	0.80	522	1.17	526	0.95	530	0.83
6	494	1.31	514	1.09	518	1.24	534	1.12	538	1.04	542	0.87
7	498	0.92	522	1.17	526	0.95	546	0.83	550	0.87	552	0.95
8	502	2.09	530	0.83	534	1.12	556	1.31	558	0.78	562	0.80
9	506	1.29	538	1.04	542	0.87	566	1.53	570	1.07	574	0.92
10	510	0.80	546	0.83	550	0.87	578	1.24	582	0.78	586	0.87
11	514	1.09	552	0.95	556	1.31	590	0.73	594	1.29	598	1.31
12	518	1.24	558	0.78	562	0.80	602	0.90	606	1.17	610	0.87
13	522	1.17	566	1.53	570	1.07	614	1.31	618	1.09	622	1.17
14	526	0.95	574	0.92	578	1.24	626	1.31	630	1.39	634	1.31
15	530	0.83	582	0.78	586	0.87	642	0.95	646	1.07	650	0.90
16	534	1.12	590	0.73	594	1.29	654	1.17	658	1.09	662	0.80
17	538	1.04	598	1.31	602	0.90	666	1.75	670	1.14	674	1.04
18	542	0.87	606	1.17	610	0.87	678	1.36	682	1.21	686	1.19
19	546	0.83	614	1.31	618	1.09	690	1.07	694	1.21	698	0.68
20	550	0.87	622	1.17	626	1.31	702	1.24	706	0.78	710	1.29
21	552	0.95	630	1.39	634	1.31						
22	556	1.31	642	0.95	646	1.07						
23	558	0.78	650	0.90	654	1.17						
24	562	0.80	658	1.09	662	0.80						
25	566	1.53	666	1.75	670	1.14						
26	570	1.07	674	1.04	678	1.36						
27	574	0.92	682	1.21	686	1.19						
28	578	1.24	690	1.07	694	1.21						
29	582	0.78	698	0.68	702	1.24						
30	586	0.87	706	0.78	710	1.29						
31	590	0.73										
32	594	1.29										
33	598	1.31										
34	602	0.90										
35	606	1.17										
36	610	0.87										
37	614	1.31										
38	618	1.09										
39	622	1.17										
40	626	1.31										
41	630	1.39										
42	634	1.31										
43	642	0.95										
44	646	1.07										
45	650	0.90										
46	654	1.17										
47	658	1.09										
48	662	0.80										
49	666	1.75										
50	670	1.14										
51	674	1.04										
52	678	1.36										
53	682	1.21										
54	686	1.19										
55	690	1.07										
56	694	1.21										
57	698	0.68										
58	702	1.24										
59	706	0.78										
60	710	1.29										

**Table A.24.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment IV of system Finney FI 041706a.

Collector No.	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)
1	714	1.36	714	1.36	718	1.29	714	1.36	718	1.29	722	1.90
2	718	1.29	722	1.90	726	1.04	726	1.04	730	1.46	732	1.00
3	722	1.90	730	1.46	732	1.00	734	1.02	736	1.00	740	1.39
4	726	1.04	734	1.02	736	1.00	744	1.14	748	1.24	752	1.17
5	730	1.46	740	1.39	744	1.14	756	1.36	760	1.17	764	1.82
6	732	1.00	748	1.24	752	1.17	768	1.21	772	1.46	776	1.17
7	734	1.02	756	1.36	760	1.17	780	1.24	784	1.17	788	1.17
8	736	1.00	764	1.82	768	1.21	792	1.43	796	1.24	800	1.46
9	740	1.39	772	1.46	776	1.17	804	1.17	808	1.17	812	1.31
10	744	1.14	780	1.24	784	1.17	816	0.87	820	1.31	824	1.39
11	748	1.24	788	1.17	792	1.43	828	1.17	832	1.31	836	1.12
12	752	1.17	796	1.24	800	1.46	840	1.39	844	1.17	848	1.31
13	756	1.36	804	1.17	808	1.17	852	1.17	856	1.07	860	1.24
14	760	1.17	812	1.31	816	0.87	864	1.60	868	1.46	872	1.31
15	764	1.82	820	1.31	824	1.39	876	1.46	880	1.29	884	1.24
16	768	1.21	828	1.17	832	1.31	888	1.39	892	3.18	896	1.14
17	772	1.46	836	1.12	840	1.39	900	1.21	904	1.09	906	1.24
18	776	1.17	844	1.17	848	1.31	910	1.17	912	1.24	916	2.45
19	780	1.24	852	1.17	856	1.07	920	1.29	924	1.39	928	1.46
20	784	1.17	860	1.24	864	1.60	932	1.39	940	0.78	944	1.24
21	788	1.17	868	1.46	872	1.31						
22	792	1.43	876	1.46	880	1.29						
23	796	1.24	884	1.24	888	1.39						
24	800	1.46	892	3.18	896	1.14						
25	804	1.17	900	1.21	904	1.09						
26	808	1.17	906	1.24	910	1.17						
27	812	1.31	912	1.24	916	2.45						
28	816	0.87	920	1.29	924	1.39						
29	820	1.31	928	1.46	932	1.39						
30	824	1.39	940	0.78	944	1.24						
31	828	1.17										
32	832	1.31										
33	836	1.12										
34	840	1.39										
35	844	1.17										
36	848	1.31										
37	852	1.17										
38	856	1.07										
39	860	1.24										
40	864	1.60										
41	868	1.46										
42	872	1.31										
43	876	1.46										
44	880	1.29										
45	884	1.24										
46	888	1.39										
47	892	3.18										
48	896	1.14										
49	900	1.21										
50	904	1.09										
51	906	1.24										
52	910	1.17										
53	912	1.24										
54	916	2.45										
55	920	1.29										
56	924	1.39										
57	928	1.46										
58	932	1.39										
59	940	0.78										
60	944	1.24										

**Table A.25.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment I of system Ford FO 3-13-06.

Collector No.	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)
1	264	0.63	264	0.63	272	0.66	264	0.63	272	0.66	280	0.61
2	272	0.66	280	0.61	288	0.73	288	0.73	296	1.75	304	0.78
3	280	0.61	296	1.75	304	0.78	312	0.80	320	0.83	328	0.83
4	288	0.73	312	0.80	320	0.83	336	0.80	344	0.73	352	0.80
5	296	1.75	328	0.83	336	0.80	360	0.80	368	0.95	376	0.95
6	304	0.78	344	0.73	352	0.80	392	0.92	400	0.73	408	0.80
7	312	0.80	360	0.80	368	0.95	416	0.80	424	1.77	432	2.11
8	320	0.83	376	0.95	392	0.92	440	2.36	448	0.83	456	0.80
9	328	0.83	400	0.73	408	0.80	464	0.78	472	0.75	480	0.80
10	336	0.80	416	0.80	424	1.77	488	0.90	496	0.92	504	0.95
11	344	0.73	432	2.11	440	2.36	510	0.95	518	0.92	524	0.97
12	352	0.80	448	0.83	456	0.80	532	1.17	540	0.80	548	1.34
13	360	0.80	464	0.78	472	0.75	556	0.80	564	0.83	572	0.73
14	368	0.95	480	0.80	488	0.90	580	2.31	588	0.83	596	1.17
15	376	0.95	496	0.92	504	0.95	604	0.75	612	0.87	620	0.78
16	392	0.92	510	0.95	518	0.92	628	0.90	636	1.21	644	0.75
17	400	0.73	524	0.97	532	1.17	652	0.80	660	0.75	668	0.73
18	408	0.80	540	0.80	548	1.34	676	0.90	684	0.92	692	1.97
19	416	0.80	556	0.80	564	0.83	700	0.73	708	0.78	716	0.73
20	424	1.77	572	0.73	580	2.31	724	0.80	732	0.80	740	0.78
21	432	2.11	588	0.83	596	1.17						
22	440	2.36	604	0.75	612	0.87						
23	448	0.83	620	0.78	628	0.90						
24	456	0.80	636	1.21	644	0.75						
25	464	0.78	652	0.80	660	0.75						
26	472	0.75	668	0.73	676	0.90						
27	480	0.80	684	0.92	692	1.97						
28	488	0.90	700	0.73	708	0.78						
29	496	0.92	716	0.73	724	0.80						
30	504	0.95	732	0.80	740	0.78						
31	510	0.95										
32	518	0.92										
33	524	0.97										
34	532	1.17										
35	540	0.80										
36	548	1.34										
37	556	0.80										
38	564	0.83										
39	572	0.73										
40	580	2.31										
41	588	0.83										
42	596	1.17										
43	604	0.75										
44	612	0.87										
45	620	0.78										
46	628	0.90										
47	636	1.21										
48	644	0.75										
49	652	0.80										
50	660	0.75										
51	668	0.73										
52	676	0.90										
53	684	0.92										
54	692	1.97										
55	700	0.73										
56	708	0.78										
57	716	0.73										
58	724	0.80										
59	732	0.80										
60	740	0.78										

**Table A.26.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment II of system Ford FO 3-13-06.

Collector No.	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)
1	748	0.87	748	0.87	756	1.26	748	0.87	756	1.26	764	1.14
2	756	1.26	764	1.14	772	1.24	772	1.24	780	0.87	788	0.87
3	764	1.14	780	0.87	788	0.87	796	1.02	804	0.90	812	0.95
4	772	1.24	796	1.02	804	0.90	820	1.24	828	0.78	836	0.70
5	780	0.87	812	0.95	820	1.24	844	0.83	852	0.80	860	0.78
6	788	0.87	828	0.78	836	0.70	868	0.73	876	0.87	884	0.87
7	796	1.02	844	0.83	852	0.80	892	1.04	900	0.95	908	1.21
8	804	0.90	860	0.78	868	0.73	916	0.87	924	0.44	932	0.73
9	812	0.95	876	0.87	884	0.87	940	0.80	948	0.85	956	0.90
10	820	1.24	892	1.04	900	0.95	964	0.80	972	1.24	980	0.85
11	828	0.78	908	1.21	916	0.87	988	0.73	996	0.63	1004	1.02
12	836	0.70	924	0.44	932	0.73	1012	0.73	1020	0.95	1028	0.87
13	844	0.83	940	0.80	948	0.85	1036	0.68	1044	0.68	1052	1.26
14	852	0.80	956	0.90	964	0.80	1060	0.85	1068	1.00	1076	0.95
15	860	0.78	972	1.24	980	0.85	1084	0.87	1092	0.80	1100	1.07
16	868	0.73	988	0.73	996	0.63	1108	0.92	1116	0.73	1124	0.58
17	876	0.87	1004	1.02	1012	0.73	1132	0.68	1140	0.92	1160	0.78
18	884	0.87	1020	0.95	1028	0.87	1168	0.78	1176	0.80	1184	0.87
19	892	1.04	1036	0.68	1044	0.68	1192	0.92	1200	1.02	1208	0.92
20	900	0.95	1052	1.26	1060	0.85	1216	0.95	1224	0.80	1232	0.92
21	908	1.21	1068	1.00	1076	0.95						
22	916	0.87	1084	0.87	1092	0.80						
23	924	0.44	1100	1.07	1108	0.92						
24	932	0.73	1116	0.73	1124	0.58						
25	940	0.80	1132	0.68	1140	0.92						
26	948	0.85	1160	0.78	1168	0.78						
27	956	0.90	1176	0.80	1184	0.87						
28	964	0.80	1192	0.92	1200	1.02						
29	972	1.24	1208	0.92	1216	0.95						
30	980	0.85	1224	0.80	1232	0.92						
31	988	0.73										
32	996	0.63										
33	1004	1.02										
34	1012	0.73										
35	1020	0.95										
36	1028	0.87										
37	1036	0.68										
38	1044	0.68										
39	1052	1.26										
40	1060	0.85										
41	1068	1.00										
42	1076	0.95										
43	1084	0.87										
44	1092	0.80										
45	1100	1.07										
46	1108	0.92										
47	1116	0.73										
48	1124	0.58										
49	1132	0.68										
50	1140	0.92										
51	1160	0.78										
52	1168	0.78										
53	1176	0.80										
54	1184	0.87										
55	1192	0.92										
56	1200	1.02										
57	1208	0.92										
58	1216	0.95										
59	1224	0.80										
60	1232	0.92										

**Table A.27.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment I of system Ford FO 3-13-06.

Collector	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	No.	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)
1	264	0.63	264	0.63	272	0.66	264	0.63	272	0.66	280	0.61
2	272	0.66	280	0.61	288	0.73	288	0.73	296	1.75	304	0.78
3	280	0.61	296	1.75	304	0.78	312	0.80	320	0.83	328	0.83
4	288	0.73	312	0.80	320	0.83	336	0.80	344	0.73	352	0.80
5	296	1.75	328	0.83	336	0.80	360	0.80	368	0.95	376	0.95
6	304	0.78	344	0.73	352	0.80	392	0.92	400	0.73	408	0.80
7	312	0.80	360	0.80	368	0.95	416	0.80	424	1.77	432	2.11
8	320	0.83	376	0.95	392	0.92	440	2.36	448	0.83	456	0.80
9	328	0.83	400	0.73	408	0.80	464	0.78	472	0.75	480	0.80
10	336	0.80	416	0.80	424	1.77	488	0.90	496	0.92	504	0.95
11	344	0.73	432	2.11	440	2.36	510	0.95	518	0.92	524	0.97
12	352	0.80	448	0.83	456	0.80	532	1.17	540	0.80	548	1.34
13	360	0.80	464	0.78	472	0.75	556	0.80	564	0.83	572	0.73
14	368	0.95	480	0.80	488	0.90	580	2.31	588	0.83	596	1.17
15	376	0.95	496	0.92	504	0.95	604	0.75	612	0.87	620	0.78
16	392	0.92	510	0.95	518	0.92	628	0.90	636	1.21	644	0.75
17	400	0.73	524	0.97	532	1.17	652	0.80	660	0.75	668	0.73
18	408	0.80	540	0.80	548	1.34	676	0.90	684	0.92	692	1.97
19	416	0.80	556	0.80	564	0.83	700	0.73	708	0.78	716	0.73
20	424	1.77	572	0.73	580	2.31	724	0.80	732	0.80	740	0.78
21	432	2.11	588	0.83	596	1.17						
22	440	2.36	604	0.75	612	0.87						
23	448	0.83	620	0.78	628	0.90						
24	456	0.80	636	1.21	644	0.75						
25	464	0.78	652	0.80	660	0.75						
26	472	0.75	668	0.73	676	0.90						
27	480	0.80	684	0.92	692	1.97						
28	488	0.90	700	0.73	708	0.78						
29	496	0.92	716	0.73	724	0.80						
30	504	0.95	732	0.80	740	0.78						
31	510	0.95										
32	518	0.92										
33	524	0.97										
34	532	1.17										
35	540	0.80										
36	548	1.34										
37	556	0.80										
38	564	0.83										
39	572	0.73										
40	580	2.31										
41	588	0.83										
42	596	1.17										
43	604	0.75										
44	612	0.87										
45	620	0.78										
46	628	0.90										
47	636	1.21										
48	644	0.75										
49	652	0.80										
50	660	0.75										
51	668	0.73										
52	676	0.90										
53	684	0.92										
54	692	1.97										
55	700	0.73										
56	708	0.78										
57	716	0.73										
58	724	0.80										
59	732	0.80										
60	740	0.78										

**Table A.28.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment II of system Ford FO 3-13-06.

Collector	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	No.	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)
1	748	0.87	748	0.87	756	1.26	748	0.87	756	1.26	764	1.14
2	756	1.26	764	1.14	772	1.24	772	1.24	780	0.87	788	0.87
3	764	1.14	780	0.87	788	0.87	796	1.02	804	0.90	812	0.95
4	772	1.24	796	1.02	804	0.90	820	1.24	828	0.78	836	0.70
5	780	0.87	812	0.95	820	1.24	844	0.83	852	0.80	860	0.78
6	788	0.87	828	0.78	836	0.70	868	0.73	876	0.87	884	0.87
7	796	1.02	844	0.83	852	0.80	892	1.04	900	0.95	908	1.21
8	804	0.90	860	0.78	868	0.73	916	0.87	924	0.44	932	0.73
9	812	0.95	876	0.87	884	0.87	940	0.80	948	0.85	956	0.90
10	820	1.24	892	1.04	900	0.95	964	0.80	972	1.24	980	0.85
11	828	0.78	908	1.21	916	0.87	988	0.73	996	0.63	1004	1.02
12	836	0.70	924	0.44	932	0.73	1012	0.73	1020	0.95	1028	0.87
13	844	0.83	940	0.80	948	0.85	1036	0.68	1044	0.68	1052	1.26
14	852	0.80	956	0.90	964	0.80	1060	0.85	1068	1.00	1076	0.95
15	860	0.78	972	1.24	980	0.85	1084	0.87	1092	0.80	1100	1.07
16	868	0.73	988	0.73	996	0.63	1108	0.92	1116	0.73	1124	0.58
17	876	0.87	1004	1.02	1012	0.73	1132	0.68	1140	0.92	1160	0.78
18	884	0.87	1020	0.95	1028	0.87	1168	0.78	1176	0.80	1184	0.87
19	892	1.04	1036	0.68	1044	0.68	1192	0.92	1200	1.02	1208	0.92
20	900	0.95	1052	1.26	1060	0.85	1216	0.95	1224	0.80	1232	0.92
21	908	1.21	1068	1.00	1076	0.95						
22	916	0.87	1084	0.87	1092	0.80						
23	924	0.44	1100	1.07	1108	0.92						
24	932	0.73	1116	0.73	1124	0.58						
25	940	0.80	1132	0.68	1140	0.92						
26	948	0.85	1160	0.78	1168	0.78						
27	956	0.90	1176	0.80	1184	0.87						
28	964	0.80	1192	0.92	1200	1.02						
29	972	1.24	1208	0.92	1216	0.95						
30	980	0.85	1224	0.80	1232	0.92						
31	988	0.73										
32	996	0.63										
33	1004	1.02										
34	1012	0.73										
35	1020	0.95										
36	1028	0.87										
37	1036	0.68										
38	1044	0.68										
39	1052	1.26										
40	1060	0.85										
41	1068	1.00										
42	1076	0.95										
43	1084	0.87										
44	1092	0.80										
45	1100	1.07										
46	1108	0.92										
47	1116	0.73										
48	1124	0.58										
49	1132	0.68										
50	1140	0.92										
51	1160	0.78										
52	1168	0.78										
53	1176	0.80										
54	1184	0.87										
55	1192	0.92										
56	1200	1.02										
57	1208	0.92										
58	1216	0.95										
59	1224	0.80										
60	1232	0.92										



**Table A.29.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment I of system Ford FO 5-16-02.

Collector No.	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)
1	210	0.51	210	0.51	218	0.63	210	0.51	218	0.63	226	0.36
2	218	0.63	226	0.36	234	3.50	234	3.50	242	1.39	250	1.31
3	226	0.36	242	1.39	250	1.31	258	0.41	266	0.80	274	0.87
4	234	3.50	258	0.41	266	0.80	282	2.99	290	1.14	298	0.63
5	242	1.39	274	0.87	282	2.99	306	0.41	314	0.66	322	0.49
6	250	1.31	290	1.14	298	0.63	330	1.68	338	2.58	346	0.29
7	258	0.41	306	0.41	314	0.66	354	0.58	362	0.29	370	0.36
8	266	0.80	322	0.49	330	1.68	378	0.51	386	0.36	394	0.44
9	274	0.87	338	2.58	346	0.29	402	1.09	410	0.32	418	0.58
10	282	2.99	354	0.58	362	0.29	426	0.29	434	0.29	442	1.97
11	290	1.14	370	0.36	378	0.51	450	0.58	458	0.58	466	0.34
12	298	0.63	386	0.36	394	0.44	474	0.66	482	0.95	490	1.31
13	306	0.41	402	1.09	410	0.32	498	1.75	506	0.46	514	0.58
14	314	0.66	418	0.58	426	0.29	522	1.04	530	0.36	538	0.61
15	322	0.49	434	0.29	442	1.97	546	0.66	554	0.58	562	1.90
16	330	1.68	450	0.58	458	0.58	570	0.51	578	0.51	586	0.36
17	338	2.58	466	0.34	474	0.66	594	0.68	602	0.29	610	0.44
18	346	0.29	482	0.95	490	1.31	618	1.31	626	0.92	634	0.90
19	354	0.58	498	1.75	506	0.46	642	0.44	650	0.87	658	2.33
20	362	0.29	514	0.58	522	1.04	666	0.36	674	0.36	682	0.83
21	370	0.36	530	0.36	538	0.61						
22	378	0.51	546	0.66	554	0.58						
23	386	0.36	562	1.90	570	0.51						
24	394	0.44	578	0.51	586	0.36						
25	402	1.09	594	0.68	602	0.29						
26	410	0.32	610	0.44	618	1.31						
27	418	0.58	626	0.92	634	0.90						
28	426	0.29	642	0.44	650	0.87						
29	434	0.29	658	2.33	666	0.36						
30	442	1.97	674	0.36	682	0.83						
31	450	0.58										
32	458	0.58										
33	466	0.34										
34	474	0.66										
35	482	0.95										
36	490	1.31										
37	498	1.75										
38	506	0.46										
39	514	0.58										
40	522	1.04										
41	530	0.36										
42	538	0.61										
43	546	0.66										
44	554	0.58										
45	562	1.90										
46	570	0.51										
47	578	0.51										
48	586	0.36										
49	594	0.68										
50	602	0.29										
51	610	0.44										
52	618	1.31										
53	626	0.92										
54	634	0.90										
55	642	0.44										
56	650	0.87										
57	658	2.33										
58	666	0.36										
59	674	0.36										
60	682	0.83										

**Table A.30.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment II of system Ford FO 5-16-02.

Collector No.	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)
1	690	0.32	690	0.32	698	0.70	690	0.32	698	0.70	706	0.58
2	698	0.70	706	0.58	714	0.39	714	0.39	722	0.29	730	1.07
3	706	0.58	722	0.29	730	1.07	738	0.75	746	0.41	754	0.41
4	714	0.39	738	0.75	746	0.41	762	0.92	770	0.56	778	0.34
5	722	0.29	754	0.41	762	0.92	786	0.36	794	0.29	802	0.22
6	730	1.07	770	0.56	778	0.34	810	0.49	818	0.63	826	0.36
7	738	0.75	786	0.36	794	0.29	834	0.36	842	0.56	850	0.34
8	746	0.41	802	0.22	810	0.49	858	0.66	866	0.66	874	0.61
9	754	0.41	818	0.63	826	0.36	882	0.36	890	0.56	898	0.56
10	762	0.92	834	0.36	842	0.56	906	0.39	914	0.32	922	0.44
11	770	0.56	850	0.34	858	0.66	930	0.41	938	0.49	946	0.46
12	778	0.34	866	0.66	874	0.61	954	0.61	962	0.46	970	0.34
13	786	0.36	882	0.36	890	0.56	978	0.34	986	0.51	994	0.22
14	794	0.29	898	0.56	906	0.39	1002	0.32	1010	0.36	1018	0.46
15	802	0.22	914	0.32	922	0.44	1026	0.41	1034	0.53	1042	0.34
16	810	0.49	930	0.41	938	0.49	1050	0.58	1058	0.44	1066	0.32
17	818	0.63	946	0.46	954	0.61	1074	0.36	1082	0.29	1090	0.70
18	826	0.36	962	0.46	970	0.34	1098	0.36	1106	0.36	1114	0.36
19	834	0.36	978	0.34	986	0.51	1122	0.61	1130	0.70	1138	0.75
20	842	0.56	994	0.22	1002	0.32	1146	0.34	1154	0.27	1162	0.44
21	850	0.34	1010	0.36	1018	0.46						
22	858	0.66	1026	0.41	1034	0.53						
23	866	0.66	1042	0.34	1050	0.58						
24	874	0.61	1058	0.44	1066	0.32						
25	882	0.36	1074	0.36	1082	0.29						
26	890	0.56	1090	0.70	1098	0.36						
27	898	0.56	1106	0.36	1114	0.36						
28	906	0.39	1122	0.61	1130	0.70						
29	914	0.32	1138	0.75	1146	0.34						
30	922	0.44	1154	0.27	1162	0.44						
31	930	0.41										
32	938	0.49										
33	946	0.46										
34	954	0.61										
35	962	0.46										
36	970	0.34										
37	978	0.34										
38	986	0.51										
39	994	0.22										
40	1002	0.32										
41	1010	0.36										
42	1018	0.46										
43	1026	0.41										
44	1034	0.53										
45	1042	0.34										
46	1050	0.58										
47	1058	0.44										
48	1066	0.32										
49	1074	0.36										
50	1082	0.29										
51	1090	0.70										
52	1098	0.36										
53	1106	0.36										
54	1114	0.36										
55	1122	0.61										
56	1130	0.70										
57	1138	0.75										
58	1146	0.34										
59	1154	0.27										
60	1162	0.44										

**Table A.31.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment I of system Harvey HV 4-10-03.

Collector	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
No.	radius	depth	radius	depth	radius	depth	radius	depth	radius	depth	radius	depth
	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)
1	383	0.80	383	0.80	393	0.90	383	0.80	393	0.90	403	0.80
2	393	0.90	403	0.80	413	0.58	413	0.58	423	1.90	433	0.66
3	403	0.80	423	1.90	433	0.66	443	0.56	453	0.49	463	0.29
4	413	0.58	443	0.56	453	0.49	473	1.75	483	0.80	493	0.87
5	423	1.90	463	0.29	473	1.75	503	3.09	513	0.44	523	0.73
6	433	0.66	483	0.80	493	0.87	533	1.36	543	0.83	553	0.87
7	443	0.56	503	3.09	513	0.44	563	0.66	573	0.51	583	0.68
8	453	0.49	523	0.73	533	1.36	593	0.63	603	0.51	613	0.49
9	463	0.29	543	0.83	553	0.87	623	0.68	633	0.58	643	0.56
10	473	1.75	563	0.66	573	0.51	653	0.51	663	0.63	673	0.68
11	483	0.80	583	0.68	593	0.63	683	0.44	693	0.32	703	0.66
12	493	0.87	603	0.51	613	0.49	713	0.92	723	0.70	733	1.53
13	503	3.09	623	0.68	633	0.58	743	0.44	753	1.75	763	2.07
14	513	0.44	643	0.56	653	0.51	773	0.44	783	0.44	793	0.22
15	523	0.73	663	0.63	673	0.68	803	0.44	813	0.15	823	0.36
16	533	1.36	683	0.44	693	0.32	833	0.29	843	0.19	853	0.49
17	543	0.83	703	0.66	713	0.92	863	0.22	873	0.92	883	0.85
18	553	0.87	723	0.70	733	1.53	893	0.56	903	0.78	913	0.51
19	563	0.66	743	0.44	753	1.75	923	0.56	933	0.51	943	0.44
20	573	0.51	763	2.07	773	0.44	953	0.56	963	0.46	973	0.58
21	583	0.68	783	0.44	793	0.22						
22	593	0.63	803	0.44	813	0.15						
23	603	0.51	823	0.36	833	0.29						
24	613	0.49	843	0.19	853	0.49						
25	623	0.68	863	0.22	873	0.92						
26	633	0.58	883	0.85	893	0.56						
27	643	0.56	903	0.78	913	0.51						
28	653	0.51	923	0.56	933	0.51						
29	663	0.63	943	0.44	953	0.56						
30	673	0.68	963	0.46	973	0.58						
31	683	0.44										
32	693	0.32										
33	703	0.66										
34	713	0.92										
35	723	0.70										
36	733	1.53										
37	743	0.44										
38	753	1.75										
39	763	2.07										
40	773	0.44										
41	783	0.44										
42	793	0.22										
43	803	0.44										
44	813	0.15										
45	823	0.36										
46	833	0.29										
47	843	0.19										
48	853	0.49										
49	863	0.22										
50	873	0.92										
51	883	0.85										
52	893	0.56										
53	903	0.78										
54	913	0.51										
55	923	0.56										
56	933	0.51										
57	943	0.44										
58	953	0.56										
59	963	0.46										
60	973	0.58										

**Table A.32.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment I of system Kiowa KI 7-8-2002.

Collector No.	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)
1	820	0.83	820	0.83	828	1.09	820	0.83	828	1.09	836	1.00
2	828	1.09	836	1.00	844	1.43	844	1.43	852	0.90	860	0.75
3	836	1.00	852	0.90	860	0.75	868	1.63	876	0.73	884	0.73
4	844	1.43	868	1.63	876	0.73	892	0.80	900	0.80	908	1.46
5	852	0.90	884	0.73	892	0.80	916	0.78	924	0.75	932	1.07
6	860	0.75	900	0.80	908	1.46	940	0.58	948	1.14	956	0.75
7	868	1.63	916	0.78	924	0.75	964	1.36	972	1.02	980	0.73
8	876	0.73	932	1.07	940	0.58	988	0.90	996	0.68	1004	0.95
9	884	0.73	948	1.14	956	0.75	1012	0.70	1020	1.48	1028	0.80
10	892	0.80	964	1.36	972	1.02	1036	0.80	1044	0.80	1052	0.80
11	900	0.80	980	0.73	988	0.90	1060	0.83	1068	0.80	1076	0.70
12	908	1.46	996	0.68	1004	0.95	1084	0.73	1092	0.73	1100	0.73
13	916	0.78	1012	0.70	1020	1.48	1108	0.87	1116	0.85	1124	0.63
14	924	0.75	1028	0.80	1036	0.80	1132	0.63	1140	1.12	1148	0.87
15	932	1.07	1044	0.80	1052	0.80	1156	0.66	1164	0.58	1172	0.78
16	940	0.58	1060	0.83	1068	0.80	1180	0.75	1188	1.34	1196	0.70
17	948	1.14	1076	0.70	1084	0.73	1204	0.85	1212	1.90	1220	0.80
18	956	0.75	1092	0.73	1100	0.73	1228	0.80	1236	0.73	1244	0.73
19	964	1.36	1108	0.87	1116	0.85	1252	0.73	1260	0.80	1268	0.78
20	972	1.02	1124	0.63	1132	0.63	1276	1.70	1284	0.51	1292	0.73
21	980	0.73	1140	1.12	1148	0.87						
22	988	0.90	1156	0.66	1164	0.58						
23	996	0.68	1172	0.78	1180	0.75						
24	1004	0.95	1188	1.34	1196	0.70						
25	1012	0.70	1204	0.85	1212	1.90						
26	1020	1.48	1220	0.80	1228	0.80						
27	1028	0.80	1236	0.73	1244	0.73						
28	1036	0.80	1252	0.73	1260	0.80						
29	1044	0.80	1268	0.78	1276	1.70						
30	1052	0.80	1284	0.51	1292	0.73						
31	1060	0.83										
32	1068	0.80										
33	1076	0.70										
34	1084	0.73										
35	1092	0.73										
36	1100	0.73										
37	1108	0.87										
38	1116	0.85										
39	1124	0.63										
40	1132	0.63										
41	1140	1.12										
42	1148	0.87										
43	1156	0.66										
44	1164	0.58										
45	1172	0.78										
46	1180	0.75										
47	1188	1.34										
48	1196	0.70										
49	1204	0.85										
50	1212	1.90										
51	1220	0.80										
52	1228	0.80										
53	1236	0.73										
54	1244	0.73										
55	1252	0.73										
56	1260	0.80										
57	1268	0.78										
58	1276	1.70										
59	1284	0.51										
60	1292	0.73										

**Table A.33.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment I of system McPherson MP 8-21-02-MPB02.

Collector	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
No.	radius	depth	radius	depth	radius	depth	radius	depth	radius	depth	radius	depth
	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)
1	0	1.46	0	1.46	8	0.95	0	1.46	8	0.95	16	0.97
2	8	0.95	16	0.97	24	1.12	24	1.12	32	1.09	40	1.17
3	16	0.97	32	1.09	40	1.17	48	1.24	56	0.92	64	2.33
4	24	1.12	48	1.24	56	0.92	72	0.95	80	0.92	88	0.90
5	32	1.09	64	2.33	72	0.95	96	1.31	104	0.97	112	1.09
6	40	1.17	80	0.92	88	0.90	120	0.95	128	1.73	136	1.00
7	48	1.24	96	1.31	104	0.97	144	1.39	152	1.39	160	1.24
8	56	0.92	112	1.09	120	0.95	168	0.90	176	1.29	184	0.87
9	64	2.33	128	1.73	136	1.00	192	0.83	200	0.87	208	0.87
10	72	0.95	144	1.39	152	1.39	216	3.43	224	0.90	232	1.75
11	80	0.92	160	1.24	168	0.90	240	0.95	248	1.02	256	2.55
12	88	0.90	176	1.29	184	0.87	264	1.00	272	1.12	280	1.63
13	96	1.31	192	0.83	200	0.87	288	0.92	296	0.73	304	1.34
14	104	0.97	208	0.87	216	3.43	312	0.87	320	1.36	328	1.07
15	112	1.09	224	0.90	232	1.75	336	1.09	344	2.87	352	2.77
16	120	0.95	240	0.95	248	1.02	360	0.97	368	0.85	376	3.06
17	128	1.73	256	2.55	264	1.00	384	0.90	392	1.31	400	2.11
18	136	1.00	272	1.12	280	1.63	408	0.95	416	0.78	424	0.73
19	144	1.39	288	0.92	296	0.73	432	0.73	440	2.92	448	0.87
20	152	1.39	304	1.34	312	0.87	456	0.80	464	2.70	472	0.87
21	160	1.24	320	1.36	328	1.07						
22	168	0.90	336	1.09	344	2.87						
23	176	1.29	352	2.77	360	0.97						
24	184	0.87	368	0.85	376	3.06						
25	192	0.83	384	0.90	392	1.31						
26	200	0.87	400	2.11	408	0.95						
27	208	0.87	416	0.78	424	0.73						
28	216	3.43	432	0.73	440	2.92						
29	224	0.90	448	0.87	456	0.80						
30	232	1.75	464	2.70	472	0.87						
31	240	0.95										
32	248	1.02										
33	256	2.55										
34	264	1.00										
35	272	1.12										
36	280	1.63										
37	288	0.92										
38	296	0.73										
39	304	1.34										
40	312	0.87										
41	320	1.36										
42	328	1.07										
43	336	1.09										
44	344	2.87										
45	352	2.77										
46	360	0.97										
47	368	0.85										
48	376	3.06										
49	384	0.90										
50	392	1.31										
51	400	2.11										
52	408	0.95										
53	416	0.78										
54	424	0.73										
55	432	0.73										
56	440	2.92										
57	448	0.87										
58	456	0.80										
59	464	2.70										
60	472	0.87										

**Table A.34.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment II of system McPherson MP 8-21-02-MPB02.

Collector No.	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)
1	472	0.87	472	0.87	480	0.73	472	0.87	480	0.73	488	0.68
2	480	0.73	488	0.68	496	0.83	496	0.83	504	1.07	512	0.95
3	488	0.68	504	1.07	512	0.95	520	0.87	528	0.73	536	0.80
4	496	0.83	520	0.87	528	0.73	544	0.83	552	0.80	560	0.83
5	504	1.07	536	0.80	544	0.83	568	2.55	576	0.95	584	0.87
6	512	0.95	552	0.80	560	0.83	592	1.51	600	0.87	608	0.73
7	520	0.87	568	2.55	576	0.95	616	1.31	624	0.68	632	1.60
8	528	0.73	584	0.87	592	1.51	640	0.83	648	0.87	656	0.83
9	536	0.80	600	0.87	608	0.73	664	1.60	672	0.80	680	0.87
10	544	0.83	616	1.31	624	0.68	688	0.87	696	0.83	704	0.95
11	552	0.80	632	1.60	640	0.83	712	0.85	720	0.87	728	0.75
12	560	0.83	648	0.87	656	0.83	736	0.80	744	1.09	752	2.33
13	568	2.55	664	1.60	672	0.80	760	0.75	768	1.09	776	1.09
14	576	0.95	680	0.87	688	0.87	784	1.09	792	1.09	800	0.95
15	584	0.87	696	0.83	704	0.95	808	0.92	816	0.95	824	0.70
16	592	1.51	712	0.85	720	0.87	832	0.73	840	0.83	848	0.80
17	600	0.87	728	0.75	736	0.80	856	0.73	864	0.80	872	1.17
18	608	0.73	744	1.09	752	2.33	880	0.87	888	0.87	896	0.87
19	616	1.31	760	0.75	768	1.09	904	1.02	912	1.46	920	1.75
20	624	0.68	776	1.09	784	1.09	928	1.46	936	1.56	944	0.61
21	632	1.60	792	1.09	800	0.95						
22	640	0.83	808	0.92	816	0.95						
23	648	0.87	824	0.70	832	0.73						
24	656	0.83	840	0.83	848	0.80						
25	664	1.60	856	0.73	864	0.80						
26	672	0.80	872	1.17	880	0.87						
27	680	0.87	888	0.87	896	0.87						
28	688	0.87	904	1.02	912	1.46						
29	696	0.83	920	1.75	928	1.46						
30	704	0.95	936	1.56	944	0.61						
31	712	0.85										
32	720	0.87										
33	728	0.75										
34	736	0.80										
35	744	1.09										
36	752	2.33										
37	760	0.75										
38	768	1.09										
39	776	1.09										
40	784	1.09										
41	792	1.09										
42	800	0.95										
43	808	0.92										
44	816	0.95										
45	824	0.70										
46	832	0.73										
47	840	0.83										
48	848	0.80										
49	856	0.73										
50	864	0.80										
51	872	1.17										
52	880	0.87										
53	888	0.87										
54	896	0.87										
55	904	1.02										
56	912	1.46										
57	920	1.75										
58	928	1.46										
59	936	1.56										
60	944	0.61										

**Table A.35.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment I of system Pawnee PN 4-01-03.

Collector	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
No.	radius	depth	radius	depth	radius	depth	radius	depth	radius	depth	radius	depth
	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)
1	350	0.70	350	0.70	358	0.68	350	0.70	358	0.68	366	0.63
2	358	0.68	366	0.63	374	1.19	374	1.19	382	0.85	390	0.70
3	366	0.63	382	0.85	390	0.70	398	0.63	406	1.12	414	0.68
4	374	1.19	398	0.63	406	1.12	422	0.70	430	0.66	438	1.17
5	382	0.85	414	0.68	422	0.70	446	0.58	454	0.66	462	0.63
6	390	0.70	430	0.66	438	1.17	470	0.73	478	0.63	486	0.58
7	398	0.63	446	0.58	454	0.66	494	0.70	502	0.68	510	0.66
8	406	1.12	462	0.63	470	0.73	518	0.63	526	0.66	534	0.63
9	414	0.68	478	0.63	486	0.58	542	0.68	550	0.66	558	0.66
10	422	0.70	494	0.70	502	0.68	566	0.66	574	0.66	582	0.68
11	430	0.66	510	0.66	518	0.63	590	0.66	598	0.73	606	0.61
12	438	1.17	526	0.66	534	0.63	614	1.31	622	0.78	630	0.63
13	446	0.58	542	0.68	550	0.66	638	0.58	646	1.07	654	0.73
14	454	0.66	558	0.66	566	0.66	662	0.66	670	0.87	678	0.58
15	462	0.63	574	0.66	582	0.68	686	0.63	694	0.73	702	0.63
16	470	0.73	590	0.66	598	0.73	710	0.66	718	0.56	726	0.68
17	478	0.63	606	0.61	614	1.31	734	0.73	742	0.66	750	0.68
18	486	0.58	622	0.78	630	0.63	758	0.56	766	0.66	774	0.70
19	494	0.70	638	0.58	646	1.07	782	0.66	790	0.63	798	0.58
20	502	0.68	654	0.73	662	0.66	806	0.63	814	0.68	822	0.70
21	510	0.66	670	0.87	678	0.58						
22	518	0.63	686	0.63	694	0.73						
23	526	0.66	702	0.63	710	0.66						
24	534	0.63	718	0.56	726	0.68						
25	542	0.68	734	0.73	742	0.66						
26	550	0.66	750	0.68	758	0.56						
27	558	0.66	766	0.66	774	0.70						
28	566	0.66	782	0.66	790	0.63						
29	574	0.66	798	0.58	806	0.63						
30	582	0.68	814	0.68	822	0.70						
31	590	0.66										
32	598	0.73										
33	606	0.61										
34	614	1.31										
35	622	0.78										
36	630	0.63										
37	638	0.58										
38	646	1.07										
39	654	0.73										
40	662	0.66										
41	670	0.87										
42	678	0.58										
43	686	0.63										
44	694	0.73										
45	702	0.63										
46	710	0.66										
47	718	0.56										
48	726	0.68										
49	734	0.73										
50	742	0.66										
51	750	0.68										
52	758	0.56										
53	766	0.66										
54	774	0.70										
55	782	0.66										
56	790	0.63										
57	798	0.58										
58	806	0.63										
59	814	0.68										
60	822	0.70										

**Table A.36.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment II of system Pawnee PN 4-01-03.

Collector	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
No.	radius	depth	radius	depth	radius	depth	radius	depth	radius	depth	radius	depth
	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)
1	830	0.58	830	0.58	838	0.58	830	0.58	838	0.58	846	0.66
2	838	0.58	846	0.66	854	0.66	854	0.66	862	0.63	870	0.58
3	846	0.66	862	0.63	870	0.58	878	0.58	886	0.63	894	0.73
4	854	0.66	878	0.58	886	0.63	902	0.66	910	1.46	918	0.66
5	862	0.63	894	0.73	902	0.66	926	1.07	934	0.70	942	0.66
6	870	0.58	910	1.46	918	0.66	950	0.61	958	0.58	966	0.66
7	878	0.58	926	1.07	934	0.70	974	0.75	982	0.63	990	0.61
8	886	0.63	942	0.66	950	0.61	998	0.61	1006	0.66	1014	0.68
9	894	0.73	958	0.58	966	0.66	1022	0.63	1030	0.61	1038	0.66
10	902	0.66	974	0.75	982	0.63	1046	0.73	1054	0.63	1062	0.63
11	910	1.46	990	0.61	998	0.61	1070	0.92	1078	0.70	1086	0.73
12	918	0.66	1006	0.66	1014	0.68	1094	0.95	1102	1.14	1110	0.51
13	926	1.07	1022	0.63	1030	0.61	1118	0.66	1126	0.66	1134	1.04
14	934	0.70	1038	0.66	1046	0.73	1142	0.61	1150	1.14	1158	0.73
15	942	0.66	1054	0.63	1062	0.63	1166	1.09	1174	0.70	1182	0.85
16	950	0.61	1070	0.92	1078	0.70	1190	0.73	1198	0.80	1206	0.73
17	958	0.58	1086	0.73	1094	0.95	1214	1.00	1222	0.66	1230	1.09
18	966	0.66	1102	1.14	1110	0.51	1238	0.80	1246	1.04	1254	0.66
19	974	0.75	1118	0.66	1126	0.66	1262	0.58	1270	0.70	1278	0.63
20	982	0.63	1134	1.04	1142	0.61	1286	0.44	1294	0.29	1302	0.15
21	990	0.61	1150	1.14	1158	0.73						
22	998	0.61	1166	1.09	1174	0.70						
23	1006	0.66	1182	0.85	1190	0.73						
24	1014	0.68	1198	0.80	1206	0.73						
25	1022	0.63	1214	1.00	1222	0.66						
26	1030	0.61	1230	1.09	1238	0.80						
27	1038	0.66	1246	1.04	1254	0.66						
28	1046	0.73	1262	0.58	1270	0.70						
29	1054	0.63	1278	0.63	1286	0.44						
30	1062	0.63	1294	0.29	1302	0.15						
31	1070	0.92										
32	1078	0.70										
33	1086	0.73										
34	1094	0.95										
35	1102	1.14										
36	1110	0.51										
37	1118	0.66										
38	1126	0.66										
39	1134	1.04										
40	1142	0.61										
41	1150	1.14										
42	1158	0.73										
43	1166	1.09										
44	1174	0.70										
45	1182	0.85										
46	1190	0.73										
47	1198	0.80										
48	1206	0.73										
49	1214	1.00										
50	1222	0.66										
51	1230	1.09										
52	1238	0.80										
53	1246	1.04										
54	1254	0.66										
55	1262	0.58										
56	1270	0.70										
57	1278	0.63										
58	1286	0.44										
59	1294	0.29										
60	1302	0.15										



**Table A.37.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment I of system Reno RN 6-08-02.

Collector	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
No.	radius	depth	radius	depth	radius	depth	radius	depth	radius	depth	radius	depth
	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)
1	343	1.09	343	1.09	355	0.73	343	1.09	355	0.73	367	0.66
2	355	0.73	367	0.66	379	0.61	379	0.61	391	0.61	403	0.63
3	367	0.66	391	0.61	403	0.63	415	1.31	427	0.61	439	0.73
4	379	0.61	415	1.31	427	0.61	451	0.58	463	0.66	475	0.73
5	391	0.61	439	0.73	451	0.58	487	0.58	499	2.02	511	0.58
6	403	0.63	463	0.66	475	0.73	523	1.36	535	1.75	547	0.61
7	415	1.31	487	0.58	499	2.02	559	1.73	571	2.04	583	0.63
8	427	0.61	511	0.58	523	1.36	595	0.95	607	0.66	619	0.73
9	439	0.73	535	1.75	547	0.61	631	0.73	643	1.46	655	0.95
10	451	0.58	559	1.73	571	2.04	667	1.14	679	0.95	691	1.75
11	463	0.66	583	0.63	595	0.95	703	0.73	715	0.66	727	0.80
12	475	0.73	607	0.66	619	0.73	739	1.31	751	0.66	763	0.95
13	487	0.58	631	0.73	643	1.46	775	1.46	787	0.73	799	0.66
14	499	2.02	655	0.95	667	1.14	811	0.73	823	0.66	835	0.58
15	511	0.58	679	0.95	691	1.75	847	0.66	859	0.73	871	0.58
16	523	1.36	703	0.73	715	0.66	883	0.73	895	0.58	907	0.66
17	535	1.75	727	0.80	739	1.31	919	0.73	931	0.66	943	0.73
18	547	0.61	751	0.66	763	0.95	955	0.73	967	0.66	979	0.66
19	559	1.73	775	1.46	787	0.73	991	0.80	999	0.73	1007	0.68
20	571	2.04	799	0.66	811	0.73	1015	0.73	1023	0.87	1031	0.63
21	583	0.63	823	0.66	835	0.58						
22	595	0.95	847	0.66	859	0.73						
23	607	0.66	871	0.58	883	0.73						
24	619	0.73	895	0.58	907	0.66						
25	631	0.73	919	0.73	931	0.66						
26	643	1.46	943	0.73	955	0.73						
27	655	0.95	967	0.66	979	0.66						
28	667	1.14	991	0.80	999	0.73						
29	679	0.95	1007	0.68	1015	0.73						
30	691	1.75	1023	0.87	1031	0.63						
31	703	0.73										
32	715	0.66										
33	727	0.80										
34	739	1.31										
35	751	0.66										
36	763	0.95										
37	775	1.46										
38	787	0.73										
39	799	0.66										
40	811	0.73										
41	823	0.66										
42	835	0.58										
43	847	0.66										
44	859	0.73										
45	871	0.58										
46	883	0.73										
47	895	0.58										
48	907	0.66										
49	919	0.73										
50	931	0.66										
51	943	0.73										
52	955	0.73										
53	967	0.66										
54	979	0.66										
55	991	0.80										
56	999	0.73										
57	1007	0.68										
58	1015	0.73										
59	1023	0.87										
60	1031	0.63										

**Table A.38.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment I of system Reno RN 6-05-00.

Collector No.	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)
1	630	0.31	630	0.31	640	0.30	630	0.31	640	0.30	650	0.33
2	640	0.30	650	0.33	660	0.28	660	0.28	670	0.30	680	0.31
3	650	0.33	670	0.30	680	0.31	690	0.30	700	0.37	710	0.37
4	660	0.28	690	0.30	700	0.37	720	0.42	730	0.27	740	0.27
5	670	0.30	710	0.37	720	0.42	750	0.32	760	0.36	770	0.31
6	680	0.31	730	0.27	740	0.27	780	0.36	790	0.33	800	0.30
7	690	0.30	750	0.32	760	0.36	810	0.57	820	0.39	830	0.29
8	700	0.37	770	0.31	780	0.36	840	0.24	850	0.32	860	0.25
9	710	0.37	790	0.33	800	0.30	870	0.24	880	0.59	890	0.28
10	720	0.42	810	0.57	820	0.39	900	0.35	910	0.36	920	0.36
11	730	0.27	830	0.29	840	0.24	930	0.37	940	0.36	950	0.88
12	740	0.27	850	0.32	860	0.25	960	0.38	970	0.33	980	0.33
13	750	0.32	870	0.24	880	0.59	990	0.31	1000	0.54	1010	0.29
14	760	0.36	890	0.28	900	0.35	1020	0.33	1030	0.35	1040	0.37
15	770	0.31	910	0.36	920	0.36	1050	0.33	1060	0.33	1070	0.49
16	780	0.36	930	0.37	940	0.36	1080	0.36	1090	0.52	1100	0.33
17	790	0.33	950	0.88	960	0.38	1110	0.29	1120	0.31	1130	0.34
18	800	0.30	970	0.33	980	0.33	1140	0.39	1150	0.62	1160	0.34
19	810	0.57	990	0.31	1000	0.54	1170	0.33	1180	0.34	1190	0.35
20	820	0.39	1010	0.29	1020	0.33	1200	0.93	1210	0.65	1220	0.29
21	830	0.29	1030	0.35	1040	0.37						
22	840	0.24	1050	0.33	1060	0.33						
23	850	0.32	1070	0.49	1080	0.36						
24	860	0.25	1090	0.52	1100	0.33						
25	870	0.24	1110	0.29	1120	0.31						
26	880	0.59	1130	0.34	1140	0.39						
27	890	0.28	1150	0.62	1160	0.34						
28	900	0.35	1170	0.33	1180	0.34						
29	910	0.36	1190	0.35	1200	0.93						
30	920	0.36	1210	0.65	1220	0.29						
31	930	0.37										
32	940	0.36										
33	950	0.88										
34	960	0.38										
35	970	0.33										
36	980	0.33										
37	990	0.31										
38	1000	0.54										
39	1010	0.29										
40	1020	0.33										
41	1030	0.35										
42	1040	0.37										
43	1050	0.33										
44	1060	0.33										
45	1070	0.49										
46	1080	0.36										
47	1090	0.52										
48	1100	0.33										
49	1110	0.29										
50	1120	0.31										
51	1130	0.34										
52	1140	0.39										
53	1150	0.62										
54	1160	0.34										
55	1170	0.33										
56	1180	0.34										
57	1190	0.35										
58	1200	0.93										
59	1210	0.65										
60	1220	0.29										

**Table A.39.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment I of system Republic Scandia Exp. Field RP 8-07-02.

Collector	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	No.	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)
1	8	0.15	8	0.15	16	0.36	8	0.15	16	0.36	24	0.66
2	16	0.36	24	0.66	32	0.90	32	0.90	40	0.87	48	0.80
3	24	0.66	40	0.87	48	0.80	56	1.34	64	0.80	72	1.53
4	32	0.90	56	1.34	64	0.80	80	1.36	88	0.87	96	0.95
5	40	0.87	72	1.53	80	1.36	104	0.78	112	0.73	120	0.75
6	48	0.80	88	0.87	96	0.95	128	0.80	136	1.53	144	1.48
7	56	1.34	104	0.78	112	0.73	152	0.80	160	0.80	168	0.80
8	64	0.80	120	0.75	128	0.80	176	0.83	184	0.75	192	0.95
9	72	1.53	136	1.53	144	1.48	200	1.09	208	0.66	216	0.51
10	80	1.36	152	0.80	160	0.80	224	0.36	232	0.44	240	0.73
11	88	0.87	168	0.80	176	0.83	248	0.90	256	0.87	264	1.46
12	96	0.95	184	0.75	192	0.95	272	0.75	280	0.87	288	0.95
13	104	0.78	200	1.09	208	0.66	296	0.73	304	0.78	312	0.80
14	112	0.73	216	0.51	224	0.36	320	1.75	328	0.92	336	0.95
15	120	0.75	232	0.44	240	0.73	344	1.60	352	1.09	360	0.87
16	128	0.80	248	0.90	256	0.87	368	0.80	376	0.73	384	1.29
17	136	1.53	264	1.46	272	0.75	392	1.46	400	0.78	408	0.75
18	144	1.48	280	0.87	288	0.95	416	0.73	424	0.87	432	0.87
19	152	0.80	296	0.73	304	0.78	440	1.17	448	0.75	456	0.78
20	160	0.80	312	0.80	320	1.75	464	0.80	472	0.73	480	0.85
21	168	0.80	328	0.92	336	0.95						
22	176	0.83	344	1.60	352	1.09						
23	184	0.75	360	0.87	368	0.80						
24	192	0.95	376	0.73	384	1.29						
25	200	1.09	392	1.46	400	0.78						
26	208	0.66	408	0.75	416	0.73						
27	216	0.51	424	0.87	432	0.87						
28	224	0.36	440	1.17	448	0.75						
29	232	0.44	456	0.78	464	0.80						
30	240	0.73	472	0.73	480	0.85						
31	248	0.90										
32	256	0.87										
33	264	1.46										
34	272	0.75										
35	280	0.87										
36	288	0.95										
37	296	0.73										
38	304	0.78										
39	312	0.80										
40	320	1.75										
41	328	0.92										
42	336	0.95										
43	344	1.60										
44	352	1.09										
45	360	0.87										
46	368	0.80										
47	376	0.73										
48	384	1.29										
49	392	1.46										
50	400	0.78										
51	408	0.75										
52	416	0.73										
53	424	0.87										
54	432	0.87										
55	440	1.17										
56	448	0.75										
57	456	0.78										
58	464	0.80										
59	472	0.73										
60	480	0.85										

**Table A.40.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment I of system Rice RC 7-06-00.

Collector	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
No.	radius	depth	radius	depth	radius	depth	radius	depth	radius	depth	radius	depth
	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)
1	540	0.83	540	0.83	550	0.68	540	0.83	550	0.68	560	0.63
2	550	0.68	560	0.63	570	0.78	570	0.78	580	0.78	590	1.36
3	560	0.63	580	0.78	590	1.36	600	0.68	610	1.51	620	0.73
4	570	0.78	600	0.68	610	1.51	630	0.73	640	1.70	650	0.63
5	580	0.78	620	0.73	630	0.73	660	0.73	670	1.60	680	0.73
6	590	1.36	640	1.70	650	0.63	690	0.63	700	0.83	710	0.83
7	600	0.68	660	0.73	670	1.60	720	0.68	730	1.31	740	1.99
8	610	1.51	680	0.73	690	0.63	750	0.73	760	0.78	770	0.78
9	620	0.73	700	0.83	710	0.83	780	0.78	790	0.73	800	0.49
10	630	0.73	720	0.68	730	1.31	810	0.73	820	0.83	830	0.87
11	640	1.70	740	1.99	750	0.73	840	0.73	850	0.78	860	0.83
12	650	0.63	760	0.78	770	0.78	870	0.68	880	0.73	890	0.68
13	660	0.73	780	0.78	790	0.73	900	1.80	910	0.78	920	0.73
14	670	1.60	800	0.49	810	0.73	930	1.26	940	0.83	950	0.73
15	680	0.73	820	0.83	830	0.87	960	1.75	970	1.02	980	1.51
16	690	0.63	840	0.73	850	0.78	990	0.68	1000	0.73	1010	0.83
17	700	0.83	860	0.83	870	0.68	1020	0.78	1030	1.85	1040	0.68
18	710	0.83	880	0.73	890	0.68	1050	0.78	1060	0.73	1070	0.68
19	720	0.68	900	1.80	910	0.78	1080	0.83	1090	0.68	1100	0.73
20	730	1.31	920	0.73	930	1.26	1110	1.36	1120	0.78	1130	0.83
21	740	1.99	940	0.83	950	0.73						
22	750	0.73	960	1.75	970	1.02						
23	760	0.78	980	1.51	990	0.68						
24	770	0.78	1000	0.73	1010	0.83						
25	780	0.78	1020	0.78	1030	1.85						
26	790	0.73	1040	0.68	1050	0.78						
27	800	0.49	1060	0.73	1070	0.68						
28	810	0.73	1080	0.83	1090	0.68						
29	820	0.83	1100	0.73	1110	1.36						
30	830	0.87	1120	0.78	1130	0.83						
31	840	0.73										
32	850	0.78										
33	860	0.83										
34	870	0.68										
35	880	0.73										
36	890	0.68										
37	900	1.80										
38	910	0.78										
39	920	0.73										
40	930	1.26										
41	940	0.83										
42	950	0.73										
43	960	1.75										
44	970	1.02										
45	980	1.51										
46	990	0.68										
47	1000	0.73										
48	1010	0.83										
49	1020	0.78										
50	1030	1.85										
51	1040	0.68										
52	1050	0.78										
53	1060	0.73										
54	1070	0.68										
55	1080	0.83										
56	1090	0.68										
57	1100	0.73										
58	1110	1.36										
59	1120	0.78										
60	1130	0.83										

**Table A.41.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment I of system Sedgwick SG 5-55-02.

Collector No.	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)
1	132	0.59	132	0.59	138	0.38	132	0.59	138	0.38	144	0.92
2	138	0.38	144	0.92	150	0.47	150	0.47	156	0.52	162	0.89
3	144	0.92	156	0.52	162	0.89	168	0.54	174	2.89	180	0.80
4	150	0.47	168	0.54	174	2.89	186	0.49	192	0.47	198	0.40
5	156	0.52	180	0.80	186	0.49	204	0.47	210	1.01	216	0.52
6	162	0.89	192	0.47	198	0.40	222	0.99	228	0.52	234	0.52
7	168	0.54	204	0.47	210	1.01	240	0.47	246	0.49	252	0.49
8	174	2.89	216	0.52	222	0.99	258	0.96	264	1.08	270	0.45
9	180	0.80	228	0.52	234	0.52	276	0.61	282	0.49	288	1.15
10	186	0.49	240	0.47	246	0.49	294	0.61	300	0.52	306	0.52
11	192	0.47	252	0.49	258	0.96	312	0.94	318	0.59	324	0.70
12	198	0.40	264	1.08	270	0.45	330	0.56	336	1.17	342	1.01
13	204	0.47	276	0.61	282	0.49	348	0.56	354	0.94	360	0.42
14	210	1.01	288	1.15	294	0.61	366	0.54	372	0.75	378	0.47
15	216	0.52	300	0.52	306	0.52	384	0.52	390	0.49	396	0.52
16	222	0.99	312	0.94	318	0.59	402	0.47	408	0.85	414	0.61
17	228	0.52	324	0.70	330	0.56	420	0.49	426	0.49	432	0.52
18	234	0.52	336	1.17	342	1.01	438	0.47	444	0.56	450	0.52
19	240	0.47	348	0.56	354	0.94	456	0.47	462	0.63	468	0.52
20	246	0.49	360	0.42	366	0.54	474	0.59	480	0.59	486	0.49
21	252	0.49	372	0.75	378	0.47						
22	258	0.96	384	0.52	390	0.49						
23	264	1.08	396	0.52	402	0.47						
24	270	0.45	408	0.85	414	0.61						
25	276	0.61	420	0.49	426	0.49						
26	282	0.49	432	0.52	438	0.47						
27	288	1.15	444	0.56	450	0.52						
28	294	0.61	456	0.47	462	0.63						
29	300	0.52	468	0.52	474	0.59						
30	306	0.52	480	0.59	486	0.49						
31	312	0.94										
32	318	0.59										
33	324	0.70										
34	330	0.56										
35	336	1.17										
36	342	1.01										
37	348	0.56										
38	354	0.94										
39	360	0.42										
40	366	0.54										
41	372	0.75										
42	378	0.47										
43	384	0.52										
44	390	0.49										
45	396	0.52										
46	402	0.47										
47	408	0.85										
48	414	0.61										
49	420	0.49										
50	426	0.49										
51	432	0.52										
52	438	0.47										
53	444	0.56										
54	450	0.52										
55	456	0.47										
56	462	0.63										
57	468	0.52										
58	474	0.59										
59	480	0.59										
60	486	0.49										

**Table A.42.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment II of system Sedgwick SG 5-55-02.

Collector	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	No.	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)
1	492	0.99	492	0.99	498	0.56	492	0.99	498	0.56	504	0.49
2	498	0.56	504	0.49	510	0.52	510	0.52	516	0.56	522	0.47
3	504	0.49	516	0.56	522	0.47	528	0.59	534	0.38	540	0.42
4	510	0.52	528	0.59	534	0.38	546	0.42	552	0.56	558	0.49
5	516	0.56	540	0.42	546	0.42	564	0.47	570	0.49	576	0.52
6	522	0.47	552	0.56	558	0.49	582	0.42	588	0.52	594	0.59
7	528	0.59	564	0.47	570	0.49	600	0.49	606	0.47	612	0.49
8	534	0.38	576	0.52	582	0.42	618	0.49	624	0.54	630	0.49
9	540	0.42	588	0.52	594	0.59	636	0.47	642	0.49	648	0.52
10	546	0.42	600	0.49	606	0.47	654	0.49	660	0.31	666	0.63
11	552	0.56	612	0.49	618	0.49	672	0.45	678	0.49	684	0.54
12	558	0.49	624	0.54	630	0.49	690	0.47	696	0.54	702	0.49
13	564	0.47	636	0.47	642	0.49	708	0.54	714	0.52	720	0.80
14	570	0.49	648	0.52	654	0.49	726	0.42	732	0.49	738	0.56
15	576	0.52	660	0.31	666	0.63	744	0.47	750	0.56	756	0.49
16	582	0.42	672	0.45	678	0.49	762	0.47	768	0.61	774	0.52
17	588	0.52	684	0.54	690	0.47	780	0.47	786	0.52	792	0.73
18	594	0.59	696	0.54	702	0.49	798	0.49	804	0.52	810	0.59
19	600	0.49	708	0.54	714	0.52	816	0.85	822	0.61	828	1.22
20	606	0.47	720	0.80	726	0.42	834	0.47	840	0.52	846	0.54
21	612	0.49	732	0.49	738	0.56						
22	618	0.49	744	0.47	750	0.56						
23	624	0.54	756	0.49	762	0.47						
24	630	0.49	768	0.61	774	0.52						
25	636	0.47	780	0.47	786	0.52						
26	642	0.49	792	0.73	798	0.49						
27	648	0.52	804	0.52	810	0.59						
28	654	0.49	816	0.85	822	0.61						
29	660	0.31	828	1.22	834	0.47						
30	666	0.63	840	0.52	846	0.54						
31	672	0.45										
32	678	0.49										
33	684	0.54										
34	690	0.47										
35	696	0.54										
36	702	0.49										
37	708	0.54										
38	714	0.52										
39	720	0.80										
40	726	0.42										
41	732	0.49										
42	738	0.56										
43	744	0.47										
44	750	0.56										
45	756	0.49										
46	762	0.47										
47	768	0.61										
48	774	0.52										
49	780	0.47										
50	786	0.52										
51	792	0.73										
52	798	0.49										
53	804	0.52										
54	810	0.59										
55	816	0.85										
56	822	0.61										
57	828	1.22										
58	834	0.47										
59	840	0.52										
60	846	0.54										

**Table A.43.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment III of system Sedgwick SG 5-55-02.

Collector No.	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)
1	852	0.49	852	0.49	858	0.56	852	0.49	858	0.56	864	0.52
2	858	0.56	864	0.52	870	0.54	870	0.54	876	0.61	882	0.56
3	864	0.52	876	0.61	882	0.56	888	0.56	894	0.52	900	0.52
4	870	0.54	888	0.56	894	0.52	906	0.45	912	0.52	918	0.56
5	876	0.61	900	0.52	906	0.45	924	0.49	930	0.47	936	0.54
6	882	0.56	912	0.52	918	0.56	942	0.47	948	0.52	954	0.54
7	888	0.56	924	0.49	930	0.47	960	0.54	966	0.47	972	0.59
8	894	0.52	936	0.54	942	0.47	978	0.54	984	0.54	990	0.56
9	900	0.52	948	0.52	954	0.54	996	0.56	1002	0.52	1008	0.54
10	906	0.45	960	0.54	966	0.47	1014	0.52	1020	0.49	1026	0.54
11	912	0.52	972	0.59	978	0.54	1032	0.52	1038	0.49	1044	0.54
12	918	0.56	984	0.54	990	0.56	1050	0.49	1056	0.56	1062	0.54
13	924	0.49	996	0.56	1002	0.52	1068	0.56	1074	0.49	1080	0.49
14	930	0.47	1008	0.54	1014	0.52	1086	0.49	1092	0.49	1098	0.49
15	936	0.54	1020	0.49	1026	0.54	1104	0.56	1110	0.52	1116	0.54
16	942	0.47	1032	0.52	1038	0.49	1122	0.56	1128	0.49	1134	0.52
17	948	0.52	1044	0.54	1050	0.49	1140	0.49	1146	0.56	1152	0.52
18	954	0.54	1056	0.56	1062	0.54	1158	0.45	1164	0.56	1170	1.13
19	960	0.54	1068	0.56	1074	0.49	1176	1.06	1182	0.49	1188	0.54
20	966	0.47	1080	0.49	1086	0.49	1194	0.49	1200	0.56	1206	0.56
21	972	0.59	1092	0.49	1098	0.49						
22	978	0.54	1104	0.56	1110	0.52						
23	984	0.54	1116	0.54	1122	0.56						
24	990	0.56	1128	0.49	1134	0.52						
25	996	0.56	1140	0.49	1146	0.56						
26	1002	0.52	1152	0.52	1158	0.45						
27	1008	0.54	1164	0.56	1170	1.13						
28	1014	0.52	1176	1.06	1182	0.49						
29	1020	0.49	1188	0.54	1194	0.49						
30	1026	0.54	1200	0.56	1206	0.56						
31	1032	0.52										
32	1038	0.49										
33	1044	0.54										
34	1050	0.49										
35	1056	0.56										
36	1062	0.54										
37	1068	0.56										
38	1074	0.49										
39	1080	0.49										
40	1086	0.49										
41	1092	0.49										
42	1098	0.49										
43	1104	0.56										
44	1110	0.52										
45	1116	0.54										
46	1122	0.56										
47	1128	0.49										
48	1134	0.52										
49	1140	0.49										
50	1146	0.56										
51	1152	0.52										
52	1158	0.45										
53	1164	0.56										
54	1170	1.13										
55	1176	1.06										
56	1182	0.49										
57	1188	0.54										
58	1194	0.49										
59	1200	0.56										
60	1206	0.56										

**Table A.44.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment I of system Sedgwick SG 3-14-03.

Collector No.	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)
1	148	0.32	148	0.32	164	0.36	148	0.32	164	0.36	180	0.36
2	164	0.36	180	0.36	196	0.36	196	0.36	212	0.39	228	0.44
3	180	0.36	212	0.39	228	0.44	244	0.29	260	0.44	276	0.51
4	196	0.36	244	0.29	260	0.44	292	0.51	308	0.44	324	0.44
5	212	0.39	276	0.51	292	0.51	340	0.44	356	0.44	372	0.44
6	228	0.44	308	0.44	324	0.44	388	0.27	404	0.44	420	0.36
7	244	0.29	340	0.44	356	0.44	436	0.36	452	0.34	468	1.29
8	260	0.44	372	0.44	388	0.27	484	0.61	500	0.51	516	0.46
9	276	0.51	404	0.44	420	0.36	532	0.49	548	0.51	564	0.51
10	292	0.51	436	0.36	452	0.34	580	0.41	588	0.44	596	0.44
11	308	0.44	468	1.29	484	0.61	604	0.51	612	0.92	620	1.80
12	324	0.44	500	0.51	516	0.46	628	0.92	636	0.58	644	0.51
13	340	0.44	532	0.49	548	0.51	652	0.44	660	0.44	668	0.51
14	356	0.44	564	0.51	580	0.41	676	0.36	684	0.36	692	0.44
15	372	0.44	588	0.44	596	0.44	700	0.41	708	0.36	716	0.66
16	388	0.27	604	0.51	612	0.92	724	0.80	732	0.44	740	0.78
17	404	0.44	620	1.80	628	0.92	748	0.58	756	1.02	764	0.29
18	420	0.36	636	0.58	644	0.51	772	0.70	780	0.27	788	0.58
19	436	0.36	652	0.44	660	0.44	796	0.90	804	0.39	812	0.46
20	452	0.34	668	0.51	676	0.36	820	0.87	828	0.53	836	1.02
21	468	1.29	684	0.36	692	0.44						
22	484	0.61	700	0.41	708	0.36						
23	500	0.51	716	0.66	724	0.80						
24	516	0.46	732	0.44	740	0.78						
25	532	0.49	748	0.58	756	1.02						
26	548	0.51	764	0.29	772	0.70						
27	564	0.51	780	0.27	788	0.58						
28	580	0.41	796	0.90	804	0.39						
29	588	0.44	812	0.46	820	0.87						
30	596	0.44	828	0.53	836	1.02						
31	604	0.51										
32	612	0.92										
33	620	1.80										
34	628	0.92										
35	636	0.58										
36	644	0.51										
37	652	0.44										
38	660	0.44										
39	668	0.51										
40	676	0.36										
41	684	0.36										
42	692	0.44										
43	700	0.41										
44	708	0.36										
45	716	0.66										
46	724	0.80										
47	732	0.44										
48	740	0.78										
49	748	0.58										
50	756	1.02										
51	764	0.29										
52	772	0.70										
53	780	0.27										
54	788	0.58										
55	796	0.90										
56	804	0.39										
57	812	0.46										
58	820	0.87										
59	828	0.53										
60	836	1.02										



**Table A.45.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment II of system Sedgwick SG 3-14-03.

Collector	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	No.	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)
1	812	0.46	812	0.46	820	0.87	812	0.46	820	0.87	828	0.53
2	820	0.87	828	0.53	836	1.02	836	1.02	844	0.51	852	0.41
3	828	0.53	844	0.51	852	0.41	860	0.58	868	0.44	876	0.49
4	836	1.02	860	0.58	868	0.44	884	0.49	892	0.51	900	0.46
5	844	0.51	876	0.49	884	0.49	908	0.51	916	0.51	924	0.66
6	852	0.41	892	0.51	900	0.46	932	0.66	940	0.51	948	0.44
7	860	0.58	908	0.51	916	0.51	956	0.56	964	0.51	972	0.73
8	868	0.44	924	0.66	932	0.66	980	0.32	988	0.41	996	0.56
9	876	0.49	940	0.51	948	0.44	1004	0.80	1012	0.39	1020	0.46
10	884	0.49	956	0.56	964	0.51	1028	0.44	1036	0.61	1044	2.21
11	892	0.51	972	0.73	980	0.32	1052	1.51	1060	0.36	1068	0.41
12	900	0.46	988	0.41	996	0.56	1076	0.36	1084	0.46	1092	0.44
13	908	0.51	1004	0.80	1012	0.39	1100	0.44	1108	0.46	1116	0.41
14	916	0.51	1020	0.46	1028	0.44	1124	0.51	1132	0.49	1140	1.00
15	924	0.66	1036	0.61	1044	2.21	1148	0.85	1156	1.07	1164	0.46
16	932	0.66	1052	1.51	1060	0.36	1172	0.70	1180	0.46	1188	0.44
17	940	0.51	1068	0.41	1076	0.36	1196	0.44	1204	0.56	1212	0.44
18	948	0.44	1084	0.46	1092	0.44	1220	0.51	1228	0.58	1236	0.66
19	956	0.56	1100	0.44	1108	0.46	1244	1.17	1252	0.85	1260	0.29
20	964	0.51	1116	0.41	1124	0.51	1268	0.29	1276	0.29	1284	0.39
21	972	0.73	1132	0.49	1140	1.00						
22	980	0.32	1148	0.85	1156	1.07						
23	988	0.41	1164	0.46	1172	0.70						
24	996	0.56	1180	0.46	1188	0.44						
25	1004	0.80	1196	0.44	1204	0.56						
26	1012	0.39	1212	0.44	1220	0.51						
27	1020	0.46	1228	0.58	1236	0.66						
28	1028	0.44	1244	1.17	1252	0.85						
29	1036	0.61	1260	0.29	1268	0.29						
30	1044	2.21	1276	0.29	1284	0.39						
31	1052	1.51										
32	1060	0.36										
33	1068	0.41										
34	1076	0.36										
35	1084	0.46										
36	1092	0.44										
37	1100	0.44										
38	1108	0.46										
39	1116	0.41										
40	1124	0.51										
41	1132	0.49										
42	1140	1.00										
43	1148	0.85										
44	1156	1.07										
45	1164	0.46										
46	1172	0.70										
47	1180	0.46										
48	1188	0.44										
49	1196	0.44										
50	1204	0.56										
51	1212	0.44										
52	1220	0.51										
53	1228	0.58										
54	1236	0.66										
55	1244	1.17										
56	1252	0.85										
57	1260	0.29										
58	1268	0.29										
59	1276	0.29										
60	1284	0.39										

**Table A.46.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment I of system Seward SW 5-15-03.

Collector	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	No.	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)
1	350	0.75	350	0.75	358	0.95	350	0.75	358	0.95	366	1.17
2	358	0.95	366	1.17	374	1.09	374	1.09	382	2.82	390	1.00
3	366	1.17	382	2.82	390	1.00	398	1.58	406	1.63	414	2.72
4	374	1.09	398	1.58	406	1.63	422	1.31	430	1.04	438	1.02
5	382	2.82	414	2.72	422	1.31	446	1.19	454	1.09	462	2.43
6	390	1.00	430	1.04	438	1.02	470	1.07	478	1.07	486	1.26
7	398	1.58	446	1.19	454	1.09	494	1.31	502	1.60	510	2.21
8	406	1.63	462	2.43	470	1.07	518	1.48	526	1.80	534	0.90
9	414	2.72	478	1.07	486	1.26	542	0.78	550	1.12	558	1.82
10	422	1.31	494	1.31	502	1.60	566	2.04	574	0.95	582	1.36
11	430	1.04	510	2.21	518	1.48	590	1.17	598	1.29	606	0.92
12	438	1.02	526	1.80	534	0.90	614	0.92	622	1.07	630	1.09
13	446	1.19	542	0.78	550	1.12	638	1.09	646	1.09	654	1.04
14	454	1.09	558	1.82	566	2.04	662	1.12	670	1.19	678	1.14
15	462	2.43	574	0.95	582	1.36	686	1.24	694	0.95	702	0.95
16	470	1.07	590	1.17	598	1.29	710	1.29	718	1.12	726	0.92
17	478	1.07	606	0.92	614	0.92	734	0.83	742	1.19	750	1.02
18	486	1.26	622	1.07	630	1.09	758	1.00	766	1.21	774	1.53
19	494	1.31	638	1.09	646	1.09	782	1.29	790	1.17	798	0.95
20	502	1.60	654	1.04	662	1.12	806	0.95	814	0.87	822	0.92
21	510	2.21	670	1.19	678	1.14						
22	518	1.48	686	1.24	694	0.95						
23	526	1.80	702	0.95	710	1.29						
24	534	0.90	718	1.12	726	0.92						
25	542	0.78	734	0.83	742	1.19						
26	550	1.12	750	1.02	758	1.00						
27	558	1.82	766	1.21	774	1.53						
28	566	2.04	782	1.29	790	1.17						
29	574	0.95	798	0.95	806	0.95						
30	582	1.36	814	0.87	822	0.92						
31	590	1.17										
32	598	1.29										
33	606	0.92										
34	614	0.92										
35	622	1.07										
36	630	1.09										
37	638	1.09										
38	646	1.09										
39	654	1.04										
40	662	1.12										
41	670	1.19										
42	678	1.14										
43	686	1.24										
44	694	0.95										
45	702	0.95										
46	710	1.29										
47	718	1.12										
48	726	0.92										
49	734	0.83										
50	742	1.19										
51	750	1.02										
52	758	1.00										
53	766	1.21										
54	774	1.53										
55	782	1.29										
56	790	1.17										
57	798	0.95										
58	806	0.95										
59	814	0.87										
60	822	0.92										

**Table A.47.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment II of system Seward SW 5-15-03.

Collector No.	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)
1	806	0.95	806	0.95	814	0.87	806	0.95	814	0.87	822	0.92
2	814	0.87	822	0.92	830	0.95	830	0.95	838	1.07	846	0.95
3	822	0.92	838	1.07	846	0.95	854	0.83	862	0.90	870	0.83
4	830	0.95	854	0.83	862	0.90	878	1.24	886	1.75	894	0.78
5	838	1.07	870	0.83	878	1.24	902	1.12	910	1.12	918	0.63
6	846	0.95	886	1.75	894	0.78	926	0.58	934	1.09	942	1.00
7	854	0.83	902	1.12	910	1.12	950	0.97	958	0.68	966	0.80
8	862	0.90	918	0.63	926	0.58	974	1.14	982	0.95	990	1.02
9	870	0.83	934	1.09	942	1.00	998	0.73	1006	0.63	1014	1.00
10	878	1.24	950	0.97	958	0.68	1022	1.21	1030	0.80	1038	0.66
11	886	1.75	966	0.80	974	1.14	1046	0.70	1054	1.29	1062	1.21
12	894	0.78	982	0.95	990	1.02	1070	0.83	1078	0.66	1086	0.63
13	902	1.12	998	0.73	1006	0.63	1094	1.21	1102	0.95	1110	0.66
14	910	1.12	1014	1.00	1022	1.21	1118	0.80	1126	1.02	1134	1.09
15	918	0.63	1030	0.80	1038	0.66	1142	0.66	1150	0.70	1158	0.68
16	926	0.58	1046	0.70	1054	1.29	1166	1.53	1174	1.31	1182	0.95
17	934	1.09	1062	1.21	1070	0.83	1190	0.51	1198	0.58	1206	1.60
18	942	1.00	1078	0.66	1086	0.63	1214	1.17	1222	0.66	1230	0.75
19	950	0.97	1094	1.21	1102	0.95	1238	0.73	1246	1.19	1254	1.24
20	958	0.68	1110	0.66	1118	0.80	1262	1.02	1270	0.83	1278	0.87
21	966	0.80	1126	1.02	1134	1.09						
22	974	1.14	1142	0.66	1150	0.70						
23	982	0.95	1158	0.68	1166	1.53						
24	990	1.02	1174	1.31	1182	0.95						
25	998	0.73	1190	0.51	1198	0.58						
26	1006	0.63	1206	1.60	1214	1.17						
27	1014	1.00	1222	0.66	1230	0.75						
28	1022	1.21	1238	0.73	1246	1.19						
29	1030	0.80	1254	1.24	1262	1.02						
30	1038	0.66	1270	0.83	1278	0.87						
31	1046	0.70										
32	1054	1.29										
33	1062	1.21										
34	1070	0.83										
35	1078	0.66										
36	1086	0.63										
37	1094	1.21										
38	1102	0.95										
39	1110	0.66										
40	1118	0.80										
41	1126	1.02										
42	1134	1.09										
43	1142	0.66										
44	1150	0.70										
45	1158	0.68										
46	1166	1.53										
47	1174	1.31										
48	1182	0.95										
49	1190	0.51										
50	1198	0.58										
51	1206	1.60										
52	1214	1.17										
53	1222	0.66										
54	1230	0.75										
55	1238	0.73										
56	1246	1.19										
57	1254	1.24										
58	1262	1.02										
59	1270	0.83										
60	1278	0.87										

**Table A.48.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment I of system Shawnee SN 6-02-05.

Collector No.	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)
1	537	0.66	537	0.66	545	0.73	537	0.66	545	0.73	553	0.87
2	545	0.73	553	0.87	561	0.92	561	0.92	569	0.80	577	0.75
3	553	0.87	569	0.80	577	0.75	585	0.58	593	0.92	601	0.95
4	561	0.92	585	0.58	593	0.92	609	0.90	617	0.87	625	0.83
5	569	0.80	601	0.95	609	0.90	633	0.85	641	0.80	649	0.78
6	577	0.75	617	0.87	625	0.83	657	0.66	665	0.85	673	1.51
7	585	0.58	633	0.85	641	0.80	681	0.75	689	0.80	697	0.66
8	593	0.92	649	0.78	657	0.66	705	0.66	713	0.90	721	0.92
9	601	0.95	665	0.85	673	1.51	729	0.87	737	0.95	745	0.73
10	609	0.90	681	0.75	689	0.80	753	0.66	761	0.85	769	0.90
11	617	0.87	697	0.66	705	0.66	777	0.87	785	0.78	793	1.09
12	625	0.83	713	0.90	721	0.92	801	0.95	809	0.90	817	0.78
13	633	0.85	729	0.87	737	0.95	825	0.95	833	0.92	841	1.07
14	641	0.80	745	0.73	753	0.66	849	0.85	857	0.97	865	0.90
15	649	0.78	761	0.85	769	0.90	873	1.02	881	0.92	889	0.87
16	657	0.66	777	0.87	785	0.78	897	0.80	905	0.87	913	0.87
17	665	0.85	793	1.09	801	0.95	921	1.02	929	0.87	937	0.92
18	673	1.51	809	0.90	817	0.78	945	0.95	953	0.80	961	1.00
19	681	0.75	825	0.95	833	0.92	969	0.97	977	0.95	985	0.95
20	689	0.80	841	1.07	849	0.85	993	0.87	1001	1.02	1009	0.92
21	697	0.66	857	0.97	865	0.90						
22	705	0.66	873	1.02	881	0.92						
23	713	0.90	889	0.87	897	0.80						
24	721	0.92	905	0.87	913	0.87						
25	729	0.87	921	1.02	929	0.87						
26	737	0.95	937	0.92	945	0.95						
27	745	0.73	953	0.80	961	1.00						
28	753	0.66	969	0.97	977	0.95						
29	761	0.85	985	0.95	993	0.87						
30	769	0.90	1001	1.02	1009	0.92						
31	777	0.87										
32	785	0.78										
33	793	1.09										
34	801	0.95										
35	809	0.90										
36	817	0.78										
37	825	0.95										
38	833	0.92										
39	841	1.07										
40	849	0.85										
41	857	0.97										
42	865	0.90										
43	873	1.02										
44	881	0.92										
45	889	0.87										
46	897	0.80										
47	905	0.87										
48	913	0.87										
49	921	1.02										
50	929	0.87										
51	937	0.92										
52	945	0.95										
53	953	0.80										
54	961	1.00										
55	969	0.97										
56	977	0.95										
57	985	0.95										
58	993	0.87										
59	1001	1.02										
60	1009	0.92										

**Table A.49.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment I of system Shawnee SN 7-18-02.

Collector	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	No.	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)
1	750	0.44	750	0.44	756	0.73	750	0.44	756	0.73	762	0.29
2	756	0.73	762	0.29	768	0.66	768	0.66	774	0.87	780	0.39
3	762	0.29	774	0.87	780	0.39	786	0.34	792	0.58	798	0.53
4	768	0.66	786	0.34	792	0.58	804	0.80	810	1.02	816	0.29
5	774	0.87	798	0.53	804	0.80	822	0.73	828	0.73	834	0.73
6	780	0.39	810	1.02	816	0.29	840	0.73	846	0.22	852	0.05
7	786	0.34	822	0.73	828	0.73	858	0.78	864	0.66	870	0.51
8	792	0.58	834	0.73	840	0.73	876	0.32	882	1.17	888	0.36
9	798	0.53	846	0.22	852	0.05	894	0.73	900	0.49	906	0.36
10	804	0.80	858	0.78	864	0.66	912	0.22	918	0.15	924	0.22
11	810	1.02	870	0.51	876	0.32	930	0.29	936	0.78	942	0.29
12	816	0.29	882	1.17	888	0.36	948	0.80	954	0.22	960	0.51
13	822	0.73	894	0.73	900	0.49	966	0.15	972	0.83	978	0.29
14	828	0.73	906	0.36	912	0.22	984	1.51	990	0.22	996	0.87
15	834	0.73	918	0.15	924	0.22	1002	0.34	1008	0.78	1014	0.12
16	840	0.73	930	0.29	936	0.78	1020	0.19	1026	1.75	1032	0.34
17	846	0.22	942	0.29	948	0.80	1038	0.29	1044	0.58	1050	0.85
18	852	0.05	954	0.22	960	0.51	1056	1.04	1062	1.09	1068	0.61
19	858	0.78	966	0.15	972	0.83	1074	0.34	1080	0.61	1086	1.00
20	864	0.66	978	0.29	984	1.51	1092	0.17	1098	1.17	1104	0.44
21	870	0.51	990	0.22	996	0.87						
22	876	0.32	1002	0.34	1008	0.78						
23	882	1.17	1014	0.12	1020	0.19						
24	888	0.36	1026	1.75	1032	0.34						
25	894	0.73	1038	0.29	1044	0.58						
26	900	0.49	1050	0.85	1056	1.04						
27	906	0.36	1062	1.09	1068	0.61						
28	912	0.22	1074	0.34	1080	0.61						
29	918	0.15	1086	1.00	1092	0.17						
30	924	0.22	1098	1.17	1104	0.44						
31	930	0.29										
32	936	0.78										
33	942	0.29										
34	948	0.80										
35	954	0.22										
36	960	0.51										
37	966	0.15										
38	972	0.83										
39	978	0.29										
40	984	1.51										
41	990	0.22										
42	996	0.87										
43	1002	0.34										
44	1008	0.78										
45	1014	0.12										
46	1020	0.19										
47	1026	1.75										
48	1032	0.34										
49	1038	0.29										
50	1044	0.58										
51	1050	0.85										
52	1056	1.04										
53	1062	1.09										
54	1068	0.61										
55	1074	0.34										
56	1080	0.61										
57	1086	1.00										
58	1092	0.17										
59	1098	1.17										
60	1104	0.44										

**Table A.50.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment I of system Sheridan SR 6-15-05.

Collector	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
No.	radius	depth	radius	depth	radius	depth	radius	depth	radius	depth	radius	depth
	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)
1	480	0.66	480	0.66	486	0.66	480	0.66	486	0.66	492	0.66
2	486	0.66	492	0.66	498	0.90	498	0.90	504	0.66	510	0.73
3	492	0.66	504	0.66	510	0.73	516	0.80	522	2.24	528	0.73
4	498	0.90	516	0.80	522	2.24	534	0.85	552	0.73	558	0.66
5	504	0.66	528	0.73	534	0.85	552	0.73	558	0.66	564	0.83
6	510	0.73	540	0.87	546	0.78	570	0.73	576	0.87	582	0.85
7	516	0.80	552	0.73	558	0.66	588	0.87	594	0.85	600	0.78
8	522	2.24	564	0.83	570	0.73	606	0.73	612	0.70	618	0.78
9	528	0.73	576	0.87	582	0.85	624	0.87	630	1.24	636	0.85
10	534	0.85	588	0.87	594	0.85	642	1.02	648	0.70	654	0.63
11	540	0.87	600	0.78	606	0.73	660	0.87	666	1.17	672	0.70
12	546	0.78	612	0.70	618	0.78	678	0.66	684	2.04	690	0.68
13	552	0.73	624	0.87	630	1.24	696	0.80	702	0.66	708	0.75
14	558	0.66	636	0.85	642	1.02	714	0.85	720	0.97	726	1.51
15	564	0.83	648	0.70	654	0.63	732	0.73	738	0.80	744	0.80
16	570	0.73	660	0.87	666	1.17	750	0.83	756	0.75	762	2.19
17	576	0.87	672	0.70	678	0.66	768	0.97	774	0.75	780	2.77
18	582	0.85	684	2.04	690	0.68	786	0.80	792	0.87	798	0.95
19	588	0.87	696	0.80	702	0.66	804	0.87	810	0.95	816	0.87
20	594	0.85	708	0.75	714	0.85	822	1.17	828	0.80	834	0.87
21	600	0.78	720	0.97	726	1.51						
22	606	0.73	732	0.73	738	0.80						
23	612	0.70	744	0.80	750	0.83						
24	618	0.78	756	0.75	762	2.19						
25	624	0.87	768	0.97	774	0.75						
26	630	1.24	780	2.77	786	0.80						
27	636	0.85	792	0.87	798	0.95						
28	642	1.02	804	0.87	810	0.95						
29	648	0.70	816	0.87	822	1.17						
30	654	0.63	828	0.80	834	0.87						
31	660	0.87										
32	666	1.17										
33	672	0.70										
34	678	0.66										
35	684	2.04										
36	690	0.68										
37	696	0.80										
38	702	0.66										
39	708	0.75										
40	714	0.85										
41	720	0.97										
42	726	1.51										
43	732	0.73										
44	738	0.80										
45	744	0.80										
46	750	0.83										
47	756	0.75										
48	762	2.19										
49	768	0.97										
50	774	0.75										
51	780	2.77										
52	786	0.80										
53	792	0.87										
54	798	0.95										
55	804	0.87										
56	810	0.95										
57	816	0.87										
58	822	1.17										
59	828	0.80										
60	834	0.87										

**Table A.51.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment II of system Sheridan SR 6-15-05.

Collector No.	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)
1	840	0.90	840	0.90	846	1.07	840	0.90	846	1.07	852	0.70
2	846	1.07	852	0.70	858	0.73	858	0.73	864	0.87	870	0.85
3	852	0.70	864	0.87	870	0.85	876	0.80	882	0.87	888	0.78
4	858	0.73	876	0.80	882	0.87	894	2.48	900	0.80	906	0.83
5	864	0.87	888	0.78	894	2.48	912	0.75	918	0.97	924	0.75
6	870	0.85	900	0.80	906	0.83	930	0.80	936	0.78	942	0.70
7	876	0.80	912	0.75	918	0.97	948	0.63	954	0.85	960	0.83
8	882	0.87	924	0.75	930	0.80	966	0.80	972	0.97	978	1.36
9	888	0.78	936	0.78	942	0.70	984	0.85	990	0.80	996	1.97
10	894	2.48	948	0.63	954	0.85	1002	0.95	1008	1.53	1014	0.78
11	900	0.80	960	0.83	966	0.80	1020	1.48	1026	0.70	1032	0.63
12	906	0.83	972	0.97	978	1.36	1038	0.66	1044	0.95	1050	0.90
13	912	0.75	984	0.85	990	0.80	1056	0.73	1062	1.09	1068	0.87
14	918	0.97	996	1.97	1002	0.95	1074	2.04	1080	0.95	1086	1.07
15	924	0.75	1008	1.53	1014	0.78	1092	2.50	1098	0.97	1104	0.80
16	930	0.80	1020	1.48	1026	0.70	1110	0.75	1116	0.73	1122	0.95
17	936	0.78	1032	0.63	1038	0.66	1128	0.83	1134	1.43	1140	1.14
18	942	0.70	1044	0.95	1050	0.90	1146	0.87	1152	0.66	1158	0.87
19	948	0.63	1056	0.73	1062	1.09	1164	0.87	1170	1.02	1176	0.66
20	954	0.85	1068	0.87	1074	2.04	1182	0.87	1188	0.80	1194	0.66
21	960	0.83	1080	0.95	1086	1.07						
22	966	0.80	1092	2.50	1098	0.97						
23	972	0.97	1104	0.80	1110	0.75						
24	978	1.36	1116	0.73	1122	0.95						
25	984	0.85	1128	0.83	1134	1.43						
26	990	0.80	1140	1.14	1146	0.87						
27	996	1.97	1152	0.66	1158	0.87						
28	1002	0.95	1164	0.87	1170	1.02						
29	1008	1.53	1176	0.66	1182	0.87						
30	1014	0.78	1188	0.80	1194	0.66						
31	1020	1.48										
32	1026	0.70										
33	1032	0.63										
34	1038	0.66										
35	1044	0.95										
36	1050	0.90										
37	1056	0.73										
38	1062	1.09										
39	1068	0.87										
40	1074	2.04										
41	1080	0.95										
42	1086	1.07										
43	1092	2.50										
44	1098	0.97										
45	1104	0.80										
46	1110	0.75										
47	1116	0.73										
48	1122	0.95										
49	1128	0.83										
50	1134	1.43										
51	1140	1.14										
52	1146	0.87										
53	1152	0.66										
54	1158	0.87										
55	1164	0.87										
56	1170	1.02										
57	1176	0.66										
58	1182	0.87										
59	1188	0.80										
60	1194	0.66										

**Table A.52.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment I of system Stafford 6-6-00.

Collector No.	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)
1	624	0.87	624	0.87	634	0.68	624	0.87	634	0.68	644	0.68
2	634	0.68	644	0.68	654	0.63	654	0.63	664	0.63	674	0.63
3	644	0.68	664	0.63	674	0.63	684	1.56	694	0.73	704	0.97
4	654	0.63	684	1.56	694	0.73	714	0.63	724	0.68	734	0.63
5	664	0.63	704	0.97	714	0.63	744	0.63	754	0.92	764	1.07
6	674	0.63	724	0.68	734	0.63	774	0.63	784	0.58	794	0.63
7	684	1.56	744	0.63	754	0.92	804	0.68	814	0.63	824	0.73
8	694	0.73	764	1.07	774	0.63	834	0.73	844	0.68	854	0.73
9	704	0.97	784	0.58	794	0.63	864	0.73	874	0.68	884	0.68
10	714	0.63	804	0.68	814	0.63	894	0.68	904	0.53	914	0.83
11	724	0.68	824	0.73	834	0.73	924	0.58	934	0.58	944	0.58
12	734	0.63	844	0.68	854	0.73	954	0.63	964	0.58	974	0.63
13	744	0.63	864	0.73	874	0.68	984	0.73	994	0.58	1004	0.73
14	754	0.92	884	0.68	894	0.68	1014	0.58	1024	0.58	1034	0.63
15	764	1.07	904	0.53	914	0.83	1044	0.63	1054	0.63	1064	0.83
16	774	0.63	924	0.58	934	0.58	1074	0.63	1084	0.63	1094	0.58
17	784	0.58	944	0.58	954	0.63	1104	0.63	1114	0.68	1124	0.58
18	794	0.63	964	0.58	974	0.63	1134	0.63	1144	0.68	1154	0.68
19	804	0.68	984	0.73	994	0.58	1164	0.68	1174	0.68	1184	0.73
20	814	0.63	1004	0.73	1014	0.58	1194	0.78	1204	0.63	1214	0.58
21	824	0.73	1024	0.58	1034	0.63						
22	834	0.73	1044	0.63	1054	0.63						
23	844	0.68	1064	0.83	1074	0.63						
24	854	0.73	1084	0.63	1094	0.58						
25	864	0.73	1104	0.63	1114	0.68						
26	874	0.68	1124	0.58	1134	0.63						
27	884	0.68	1144	0.68	1154	0.68						
28	894	0.68	1164	0.68	1174	0.68						
29	904	0.53	1184	0.73	1194	0.78						
30	914	0.83	1204	0.63	1214	0.58						
31	924	0.58										
32	934	0.58										
33	944	0.58										
34	954	0.63										
35	964	0.58										
36	974	0.63										
37	984	0.73										
38	994	0.58										
39	1004	0.73										
40	1014	0.58										
41	1024	0.58										
42	1034	0.63										
43	1044	0.63										
44	1054	0.63										
45	1064	0.83										
46	1074	0.63										
47	1084	0.63										
48	1094	0.58										
49	1104	0.63										
50	1114	0.68										
51	1124	0.58										
52	1134	0.63										
53	1144	0.68										
54	1154	0.68										
55	1164	0.68										
56	1174	0.68										
57	1184	0.73										
58	1194	0.78										
59	1204	0.63										
60	1214	0.58										



**Table A.53.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment I of system Stevens Rome Farms SV 5-12-05.

Collector	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	radius	depth	radius	depth	radius	depth	radius	depth	radius	depth	radius	depth
No.	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)	(ft)	(in.)
1	24	0.22	24	0.22	30	2.80	24	0.22	30	2.80	36	3.53
2	30	2.80	36	3.53	42	3.46	42	3.46	48	1.73	54	2.23
3	36	3.53	48	1.73	54	2.23	60	1.95	66	3.29	72	4.15
4	42	3.46	60	1.95	66	3.29	78	1.13	84	2.28	90	1.45
5	48	1.73	72	4.15	78	1.13	96	1.14	102	0.39	108	0.76
6	54	2.23	84	2.28	90	1.45	114	0.74	120	1.14	126	1.33
7	60	1.95	96	1.14	102	0.39	132	0.56	138	0.34	144	1.12
8	66	3.29	108	0.76	114	0.74	150	3.88	156	0.89	162	0.77
9	72	4.15	120	1.14	126	1.33	168	0.85	174	0.93	180	1.30
10	78	1.13	132	0.56	138	0.34	186	0.66	192	1.00	198	0.95
11	84	2.28	144	1.12	150	3.88	204	0.75	210	1.24	216	0.94
12	90	1.45	156	0.89	162	0.77	222	1.52	228	0.87	234	0.90
13	96	1.14	168	0.85	174	0.93	240	0.81	246	1.62	252	2.64
14	102	0.39	180	1.30	186	0.66	258	1.07	264	1.27	270	0.57
15	108	0.76	192	1.00	198	0.95	276	0.99	282	1.21	288	1.13
16	114	0.74	204	0.75	210	1.24	294	0.97	300	0.76	306	0.46
17	120	1.14	216	0.94	222	1.52	312	0.46	318	0.86	324	0.67
18	126	1.33	228	0.87	234	0.90	330	0.87	336	1.17	342	0.46
19	132	0.56	240	0.81	246	1.62	348	0.95	354	0.63	360	1.15
20	138	0.34	252	2.64	258	1.07	366	0.68	372	0.94	378	0.60
21	144	1.12	264	1.27	270	0.57						
22	150	3.88	276	0.99	282	1.21						
23	156	0.89	288	1.13	294	0.97						
24	162	0.77	300	0.76	306	0.46						
25	168	0.85	312	0.46	318	0.86						
26	174	0.93	324	0.67	330	0.87						
27	180	1.30	336	1.17	342	0.46						
28	186	0.66	348	0.95	354	0.63						
29	192	1.00	360	1.15	366	0.68						
30	198	0.95	372	0.94	378	0.60						
31	204	0.75										
32	210	1.24										
33	216	0.94										
34	222	1.52										
35	228	0.87										
36	234	0.90										
37	240	0.81										
38	246	1.62										
39	252	2.64										
40	258	1.07										
41	264	1.27										
42	270	0.57										
43	276	0.99										
44	282	1.21										
45	288	1.13										
46	294	0.97										
47	300	0.76										
48	306	0.46										
49	312	0.46										
50	318	0.86										
51	324	0.67										
52	330	0.87										
53	336	1.17										
54	342	0.46										
55	348	0.95										
56	354	0.63										
57	360	1.15										
58	366	0.68										
59	372	0.94										
60	378	0.60										

**Table A.54.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment II of system Stevens Rome Farms SV 5-12-05.

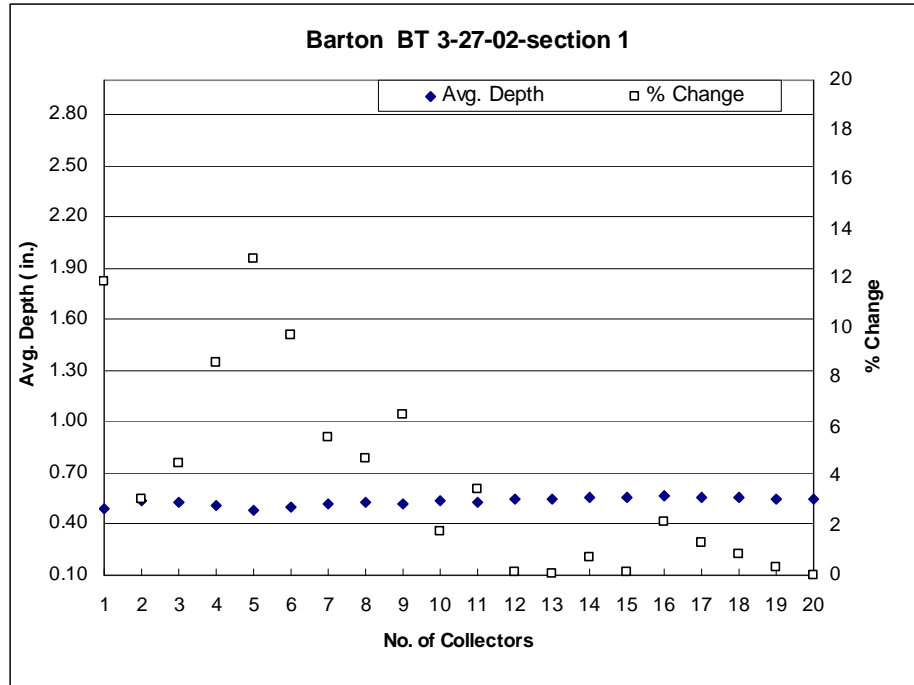
Collector No.	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)
1	384	0.84	384	0.84	390	1.61	384	0.84	390	1.61	396	0.49
2	390	1.61	396	0.49	402	1.00	402	1.00	408	0.73	414	0.41
3	396	0.49	408	0.73	414	0.41	420	0.52	426	1.14	432	0.44
4	402	1.00	420	0.52	426	1.14	438	0.85	444	0.78	450	0.71
5	408	0.73	432	0.44	438	0.85	456	0.89	462	0.76	468	0.68
6	414	0.41	444	0.78	450	0.71	474	0.66	480	0.74	486	0.72
7	420	0.52	456	0.89	462	0.76	492	0.87	498	1.04	504	0.75
8	426	1.14	468	0.68	474	0.66	510	1.10	516	0.62	522	0.92
9	432	0.44	480	0.74	486	0.72	528	0.64	534	0.82	540	0.41
10	438	0.85	492	0.87	498	1.04	546	0.45	552	0.76	558	1.89
11	444	0.78	504	0.75	510	1.10	564	0.69	570	0.75	576	1.69
12	450	0.71	516	0.62	522	0.92	582	0.68	588	0.68	594	0.80
13	456	0.89	528	0.64	534	0.82	600	0.58	606	0.88	612	0.69
14	462	0.76	540	0.41	546	0.45	618	1.04	624	0.70	630	1.48
15	468	0.68	552	0.76	558	1.89	636	0.68	642	0.81	648	0.73
16	474	0.66	564	0.69	570	0.75	654	0.60	660	0.56	666	0.62
17	480	0.74	576	1.69	582	0.68	672	0.79	678	1.13	684	0.70
18	486	0.72	588	0.68	594	0.80	690	0.76	696	0.83	702	0.99
19	492	0.87	600	0.58	606	0.88	708	0.79	714	0.65	720	0.41
20	498	1.04	612	0.69	618	1.04	726	0.82	732	0.83	738	0.86
21	504	0.75	624	0.70	630	1.48						
22	510	1.10	636	0.68	642	0.81						
23	516	0.62	648	0.73	654	0.60						
24	522	0.92	660	0.56	666	0.62						
25	528	0.64	672	0.79	678	1.13						
26	534	0.82	684	0.70	690	0.76						
27	540	0.41	696	0.83	702	0.99						
28	546	0.45	708	0.79	714	0.65						
29	552	0.76	720	0.41	726	0.82						
30	558	1.89	732	0.83	738	0.86						
31	564	0.69										
32	570	0.75										
33	576	1.69										
34	582	0.68										
35	588	0.68										
36	594	0.80										
37	600	0.58										
38	606	0.88										
39	612	0.69										
40	618	1.04										
41	624	0.70										
42	630	1.48										
43	636	0.68										
44	642	0.81										
45	648	0.73										
46	654	0.60										
47	660	0.56										
48	666	0.62										
49	672	0.79										
50	678	1.13										
51	684	0.70										
52	690	0.76										
53	696	0.83										
54	702	0.99										
55	708	0.79										
56	714	0.65										
57	720	0.41										
58	726	0.82										
59	732	0.83										
60	738	0.86										

**Table A.55.** Base data set and subsets of center pivot measured depths at progressive radial distances from the pivot point for segment III of system Stevens Rome Farms SV 5-12-05.

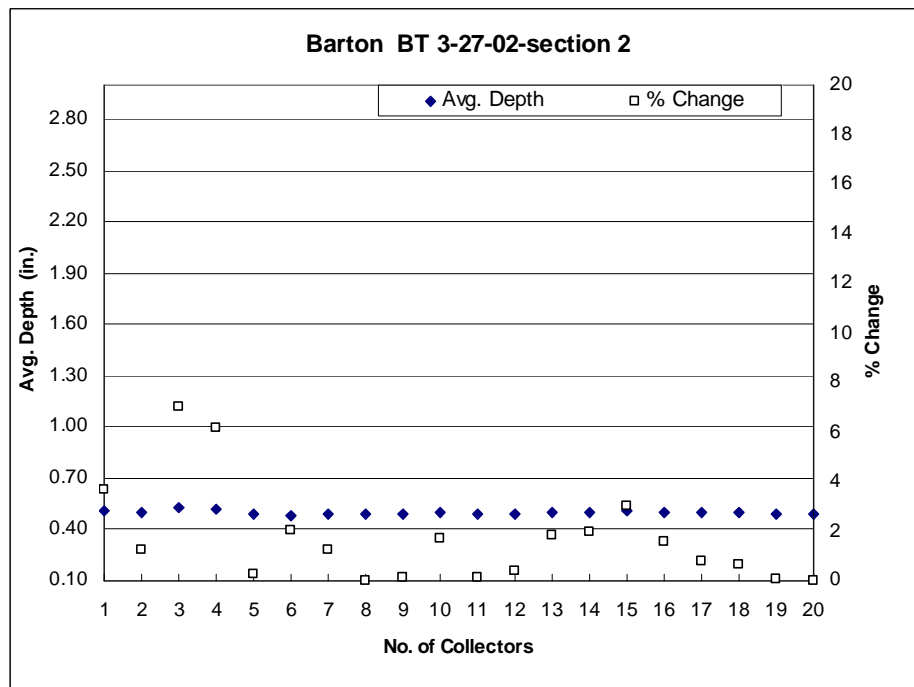
Collector	Base Data Set		Subset A1		Subset A2		Subset B1		Subset B2		Subset B3	
	No.	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)	depth (in.)	radius (ft)
1	744	1.48	744	1.48	750	0.44	744	1.48	750	0.44	756	1.38
2	750	0.44	756	1.38	762	0.92	762	0.92	768	0.85	774	0.77
3	756	1.38	768	0.85	774	0.77	780	0.53	786	1.09	792	1.00
4	762	0.92	780	0.53	786	1.09	798	0.56	804	0.88	810	0.86
5	768	0.85	792	1.00	798	0.56	816	1.12	822	0.86	828	0.87
6	774	0.77	804	0.88	810	0.86	834	0.61	840	0.61	846	0.91
7	780	0.53	816	1.12	822	0.86	852	1.01	858	0.94	864	0.60
8	786	1.09	828	0.87	834	0.61	870	0.72	876	0.56	882	1.09
9	792	1.00	840	0.61	846	0.91	888	0.97	894	0.87	900	1.17
10	798	0.56	852	1.01	858	0.94	906	1.08	912	0.87	918	0.88
11	804	0.88	864	0.60	870	0.72	924	0.87	930	0.73	936	0.81
12	810	0.86	876	0.56	882	1.09	942	0.67	948	0.81	954	0.64
13	816	1.12	888	0.97	894	0.87	960	0.61	966	0.66	972	0.88
14	822	0.86	900	1.17	906	1.08	978	0.79	984	0.94	990	1.08
15	828	0.87	912	0.87	918	0.88	996	0.69	1002	0.82	1008	0.94
16	834	0.61	924	0.87	930	0.73	1014	0.71	1020	0.69	1026	0.66
17	840	0.61	936	0.81	942	0.67	1032	1.21	1038	0.61	1044	0.75
18	846	0.91	948	0.81	954	0.64	1050	1.11	1056	0.72	1062	0.82
19	852	1.01	960	0.61	966	0.66	1068	0.85	1074	0.63	1080	0.73
20	858	0.94	972	0.88	978	0.79	1086	0.71	1092	0.86	1098	0.72
21	864	0.60	984	0.94	990	1.08						
22	870	0.72	996	0.69	1002	0.82						
23	876	0.56	1008	0.94	1014	0.71						
24	882	1.09	1020	0.69	1026	0.66						
25	888	0.97	1032	1.21	1038	0.61						
26	894	0.87	1044	0.75	1050	1.11						
27	900	1.17	1056	0.72	1062	0.82						
28	906	1.08	1068	0.85	1074	0.63						
29	912	0.87	1080	0.73	1086	0.71						
30	918	0.88	1092	0.86	1098	0.72						
31	924	0.87										
32	930	0.73										
33	936	0.81										
34	942	0.67										
35	948	0.81										
36	954	0.64										
37	960	0.61										
38	966	0.66										
39	972	0.88										
40	978	0.79										
41	984	0.94										
42	990	1.08										
43	996	0.69										
44	1002	0.82										
45	1008	0.94										
46	1014	0.71										
47	1020	0.69										
48	1026	0.66										
49	1032	1.21										
50	1038	0.61										
51	1044	0.75										
52	1050	1.11										
53	1056	0.72										
54	1062	0.82										
55	1068	0.85										
56	1074	0.63										
57	1080	0.73										
58	1086	0.71										
59	1092	0.86										
60	1098	0.72										

## **Appendix B – Figures**

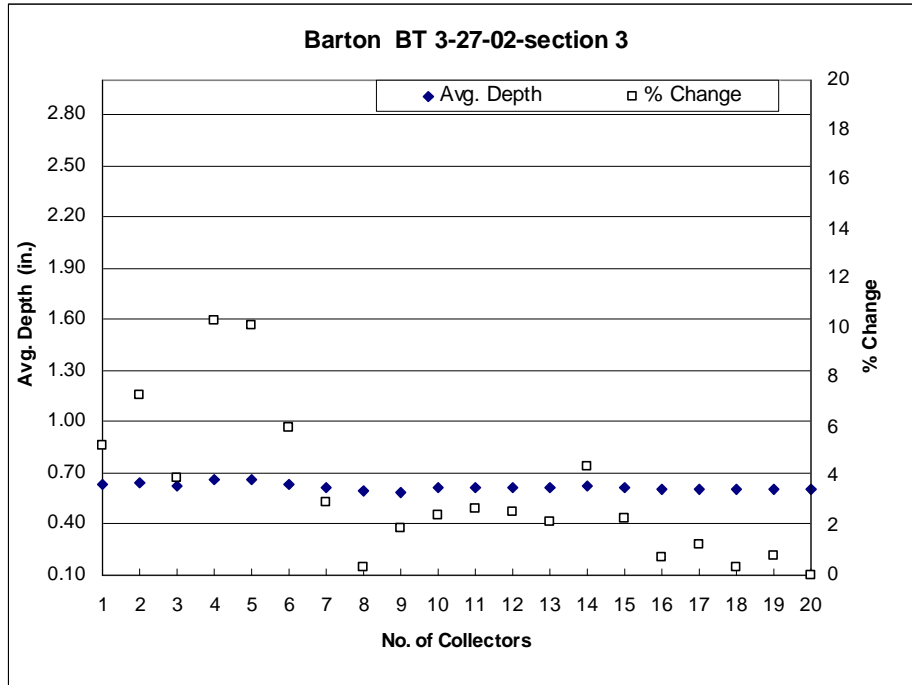
Graphs showing (analysis 2: Average Depth) the average depth and associated % change from the base average depth for collector subsets (19, 18, 17,.....1) from the base set of collectors for all the divided sections of all the irrigation system data sets.



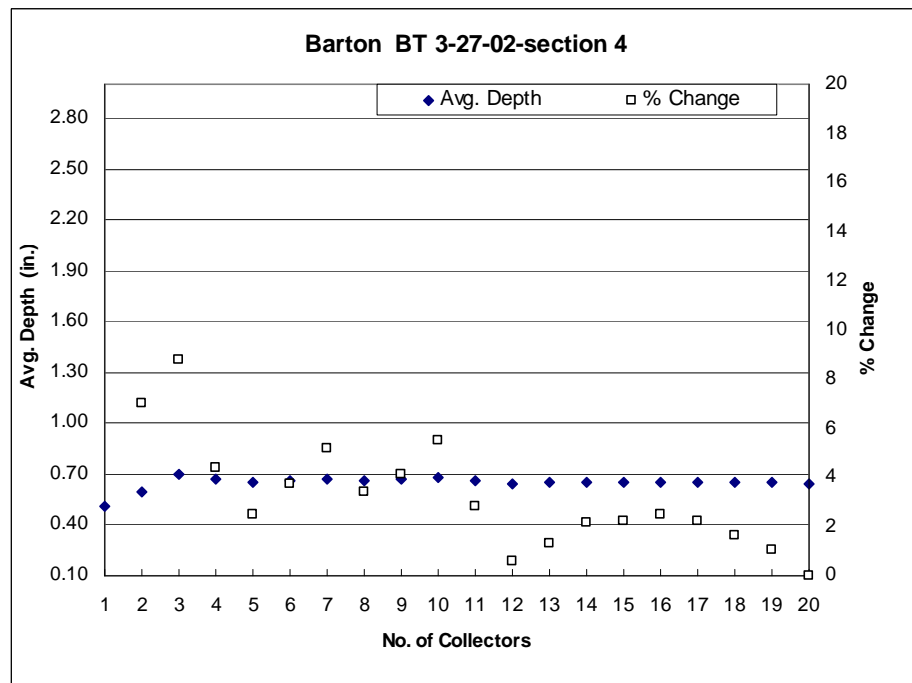
**Figure B.1.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-1 of the Barton BT 3-27-02 irrigation system data set.



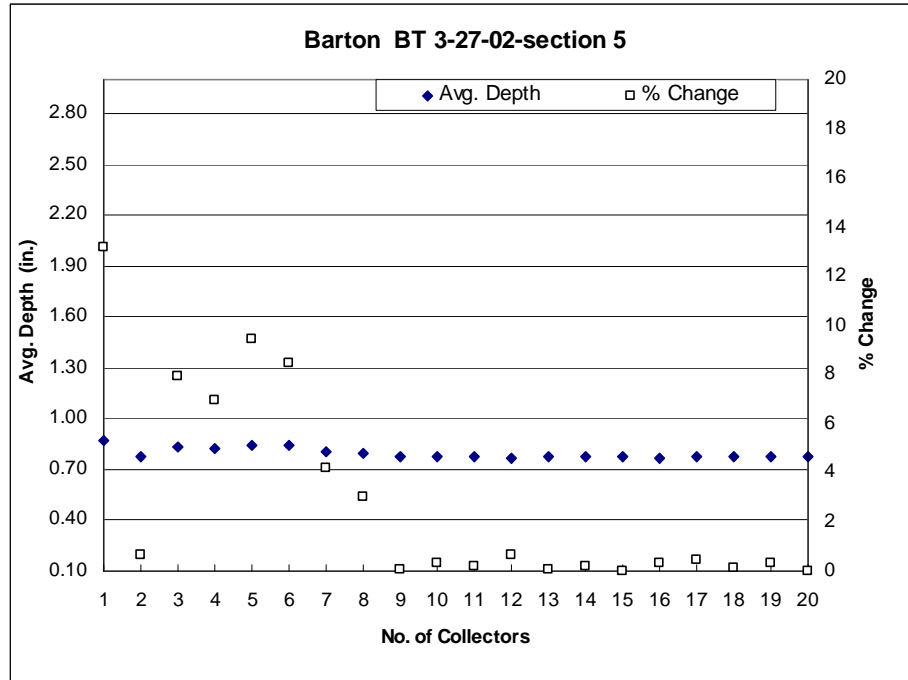
**Figure B.2.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-2 of the Barton BT 3-27-02 irrigation system data set.



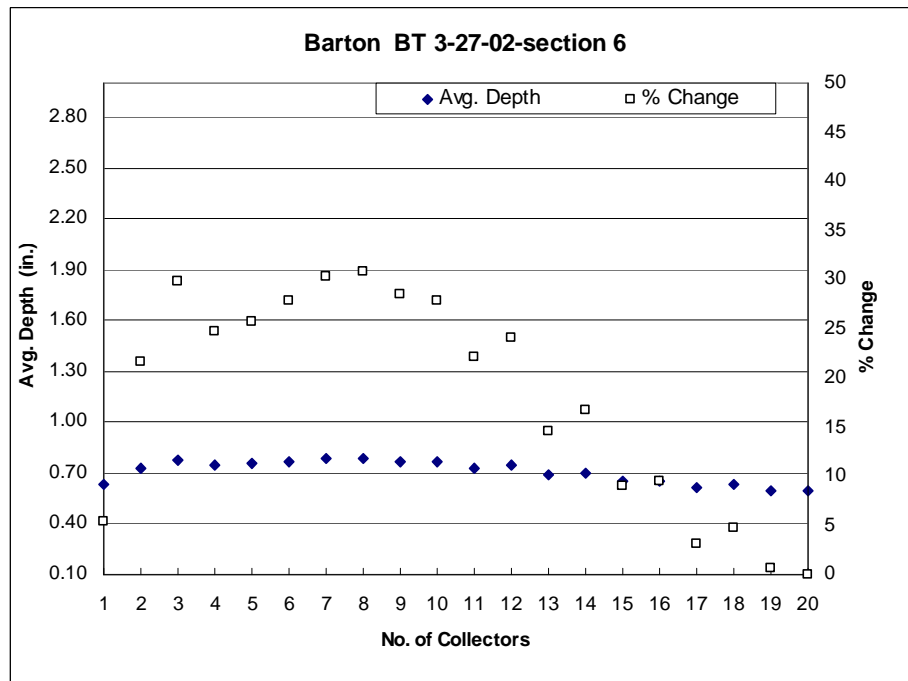
**Figure B.3.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-3 of the Barton BT 3-27-02 irrigation system data set.



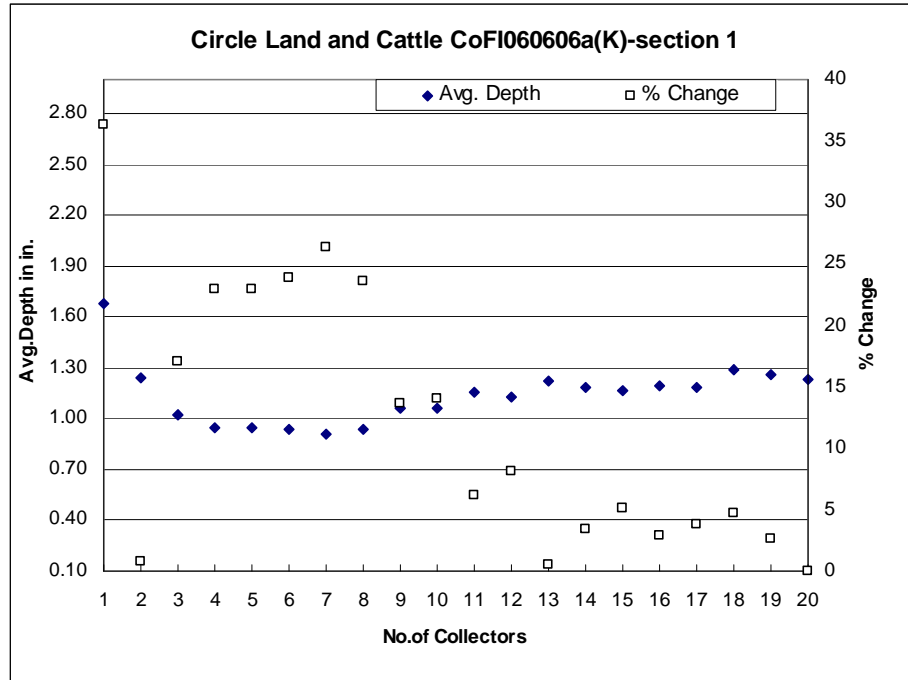
**Figure B.4.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-4 of the Barton BT 3-27-02 irrigation system data set.



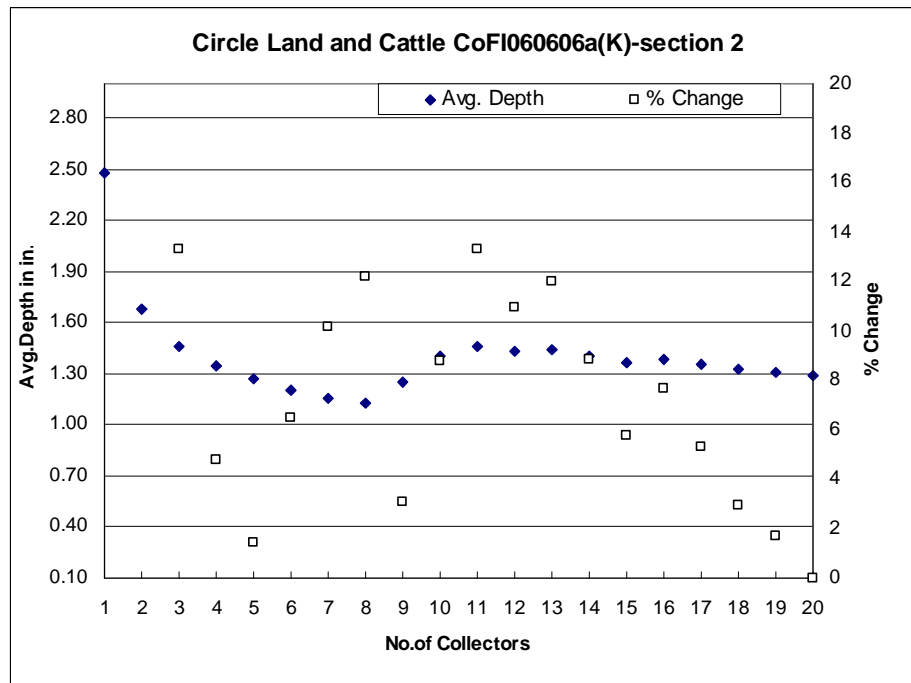
**Figure B.5.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-5 of the Barton BT 3-27-02 irrigation system data set.



**Figure B.6.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-6 of the Barton BT 3-27-02 irrigation system data set.

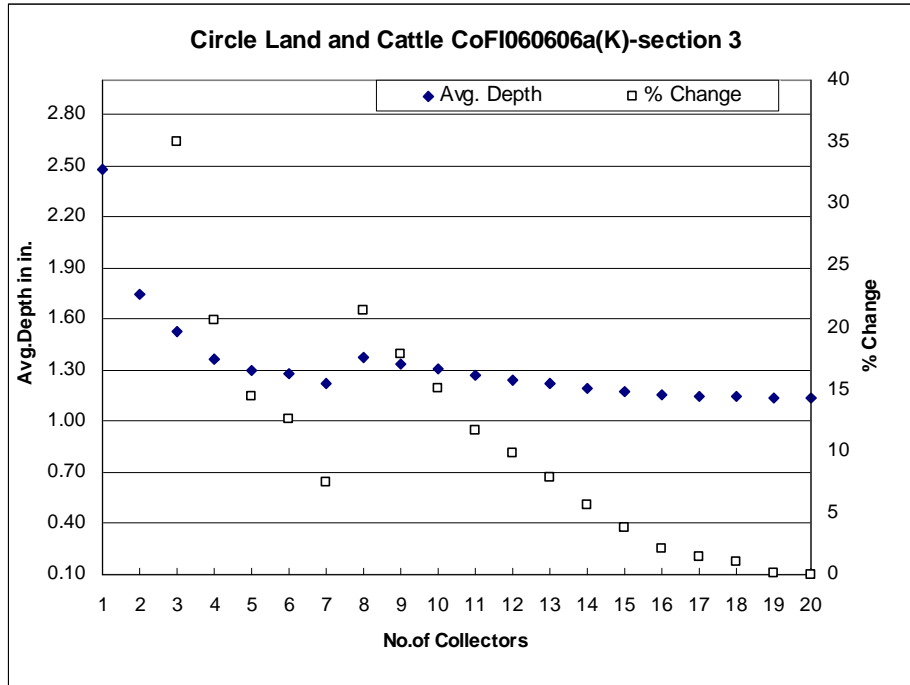


**Figure B.7.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-1 of the Circle Land and Cattle CoFI060606a(K) irrigation system data set.

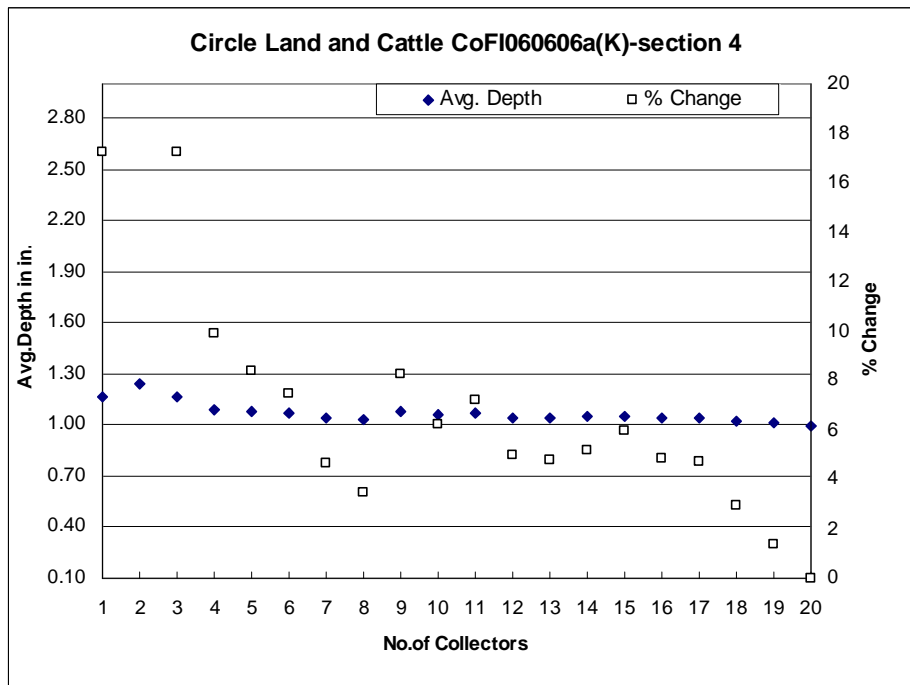


**Figure B.8.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17,..1) from the base set of 20 collectors for section-2 of the Circle Land and Cattle CoFI060606a(K) irrigation system data set.

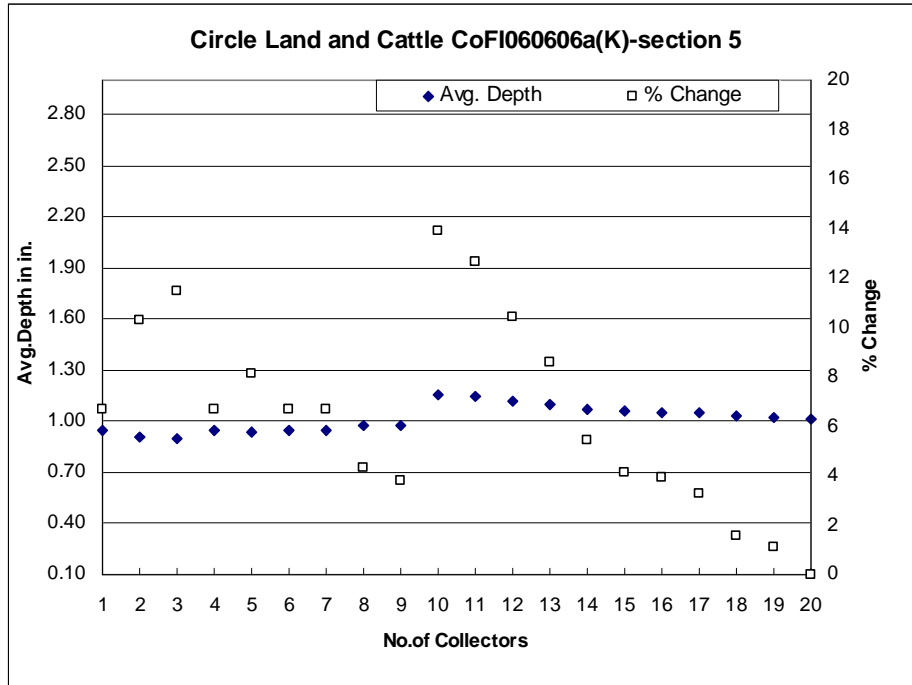




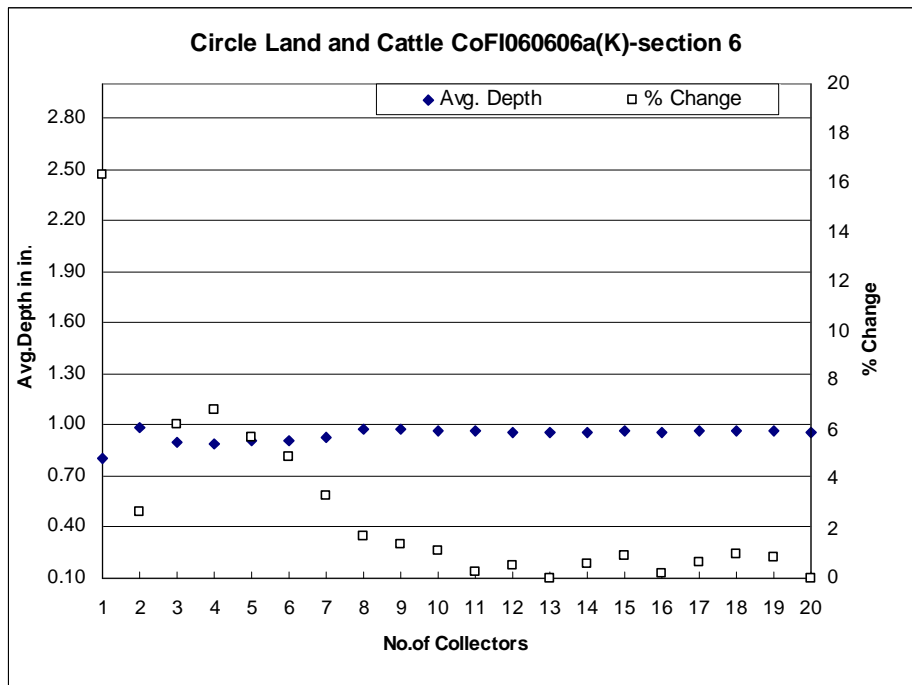
**Figure B.9.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-3 of the Circle Land and Cattle CoFI060606a(K) irrigation system data set.



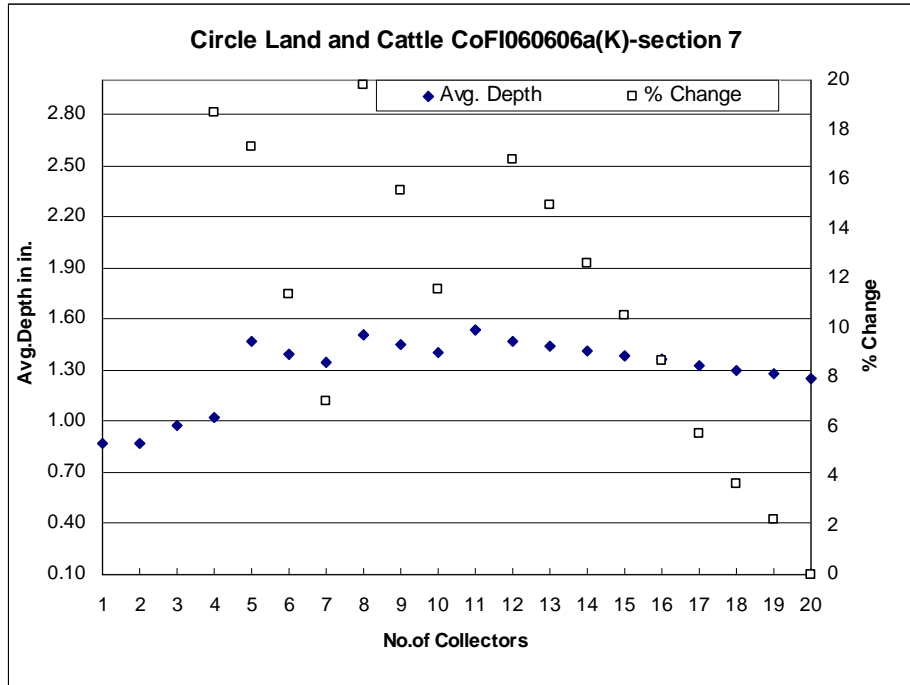
**Figure B.10.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-4 of the Circle Land and Cattle CoFI060606a(K) irrigation system data set.



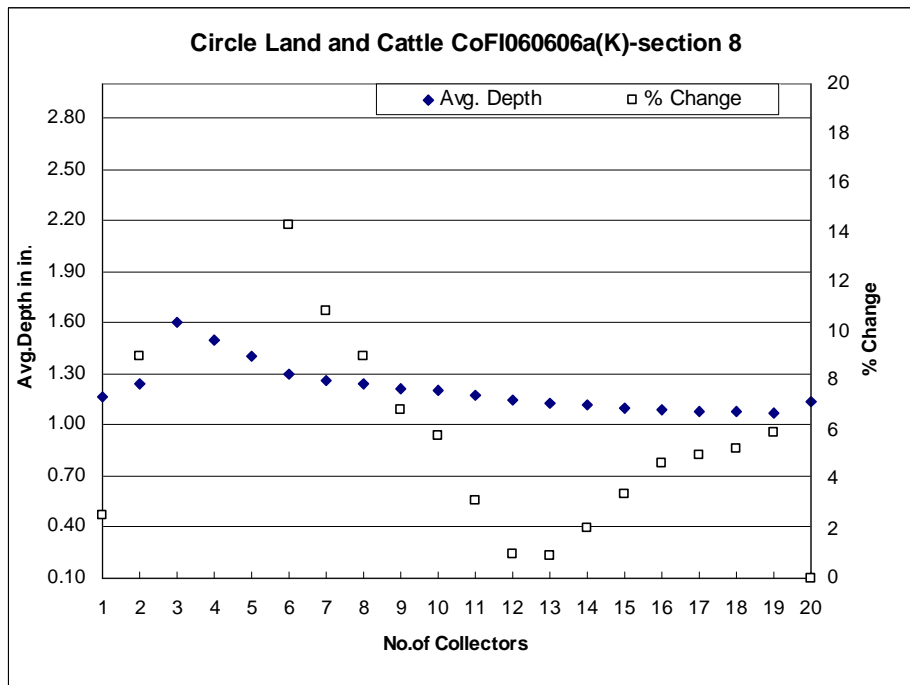
**Figure B.11.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-5 of the Circle Land and Cattle CoFI060606a(K)irrigation system data set.



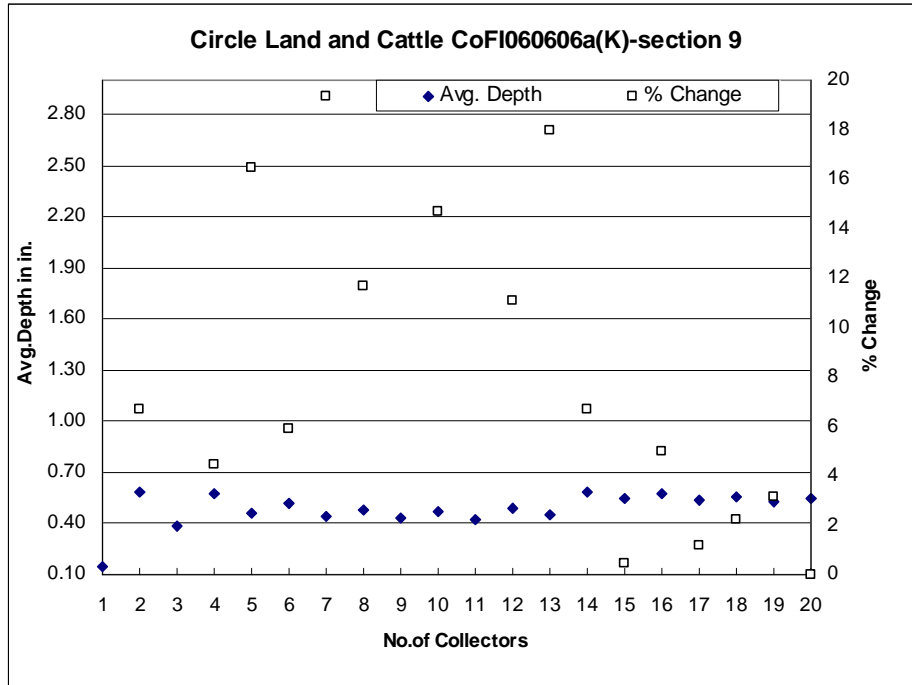
**Figure B.12.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-6 of the Circle Land and Cattle CoFI060606a(K)irrigation system data set.



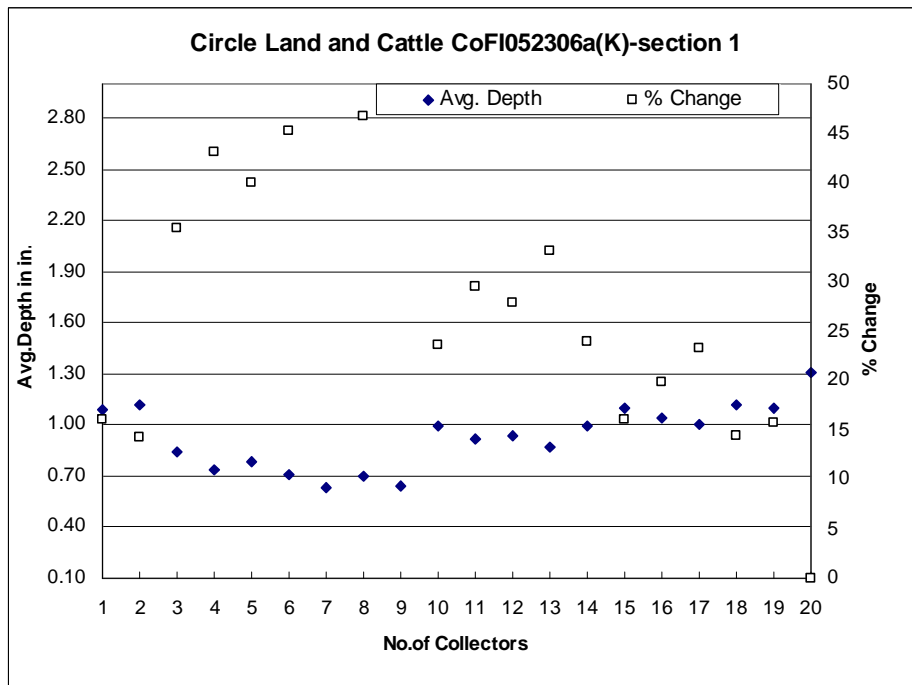
**Figure B.13.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-7 of the Circle Land and Cattle CoFI060606a(K) irrigation system data set.



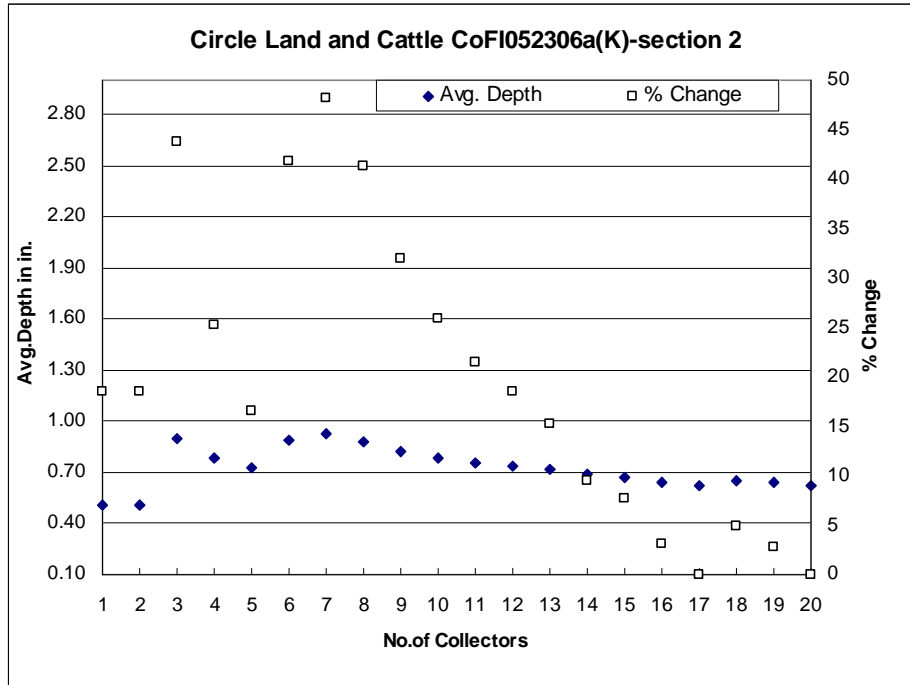
**Figure B.14.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-8 of the Circle Land and Cattle CoFI060606a(K) irrigation system data set.



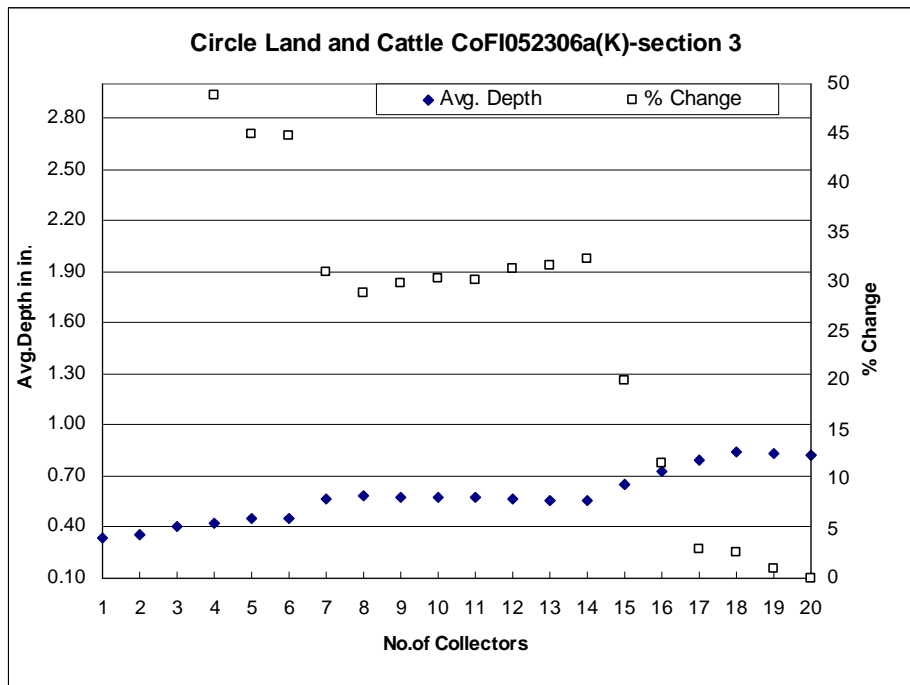
**Figure B.15.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-9 of the Circle Land and Cattle CoFI060606a(K)irrigation system data set.



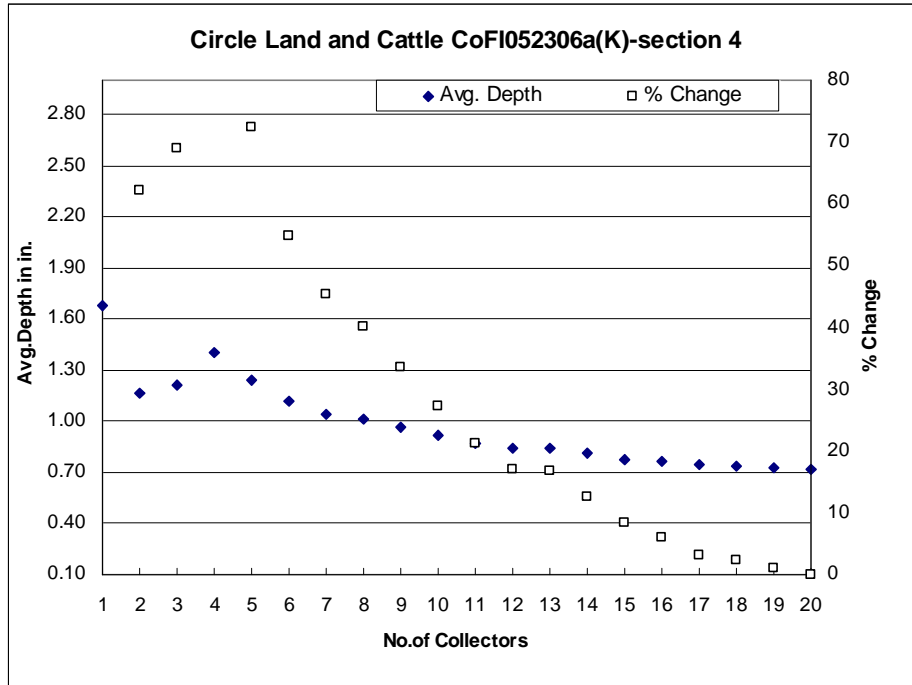
**Figure B.16.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-1 of the Circle Land and Cattle CoFI052306a(K)-section 15irrigation system data set.



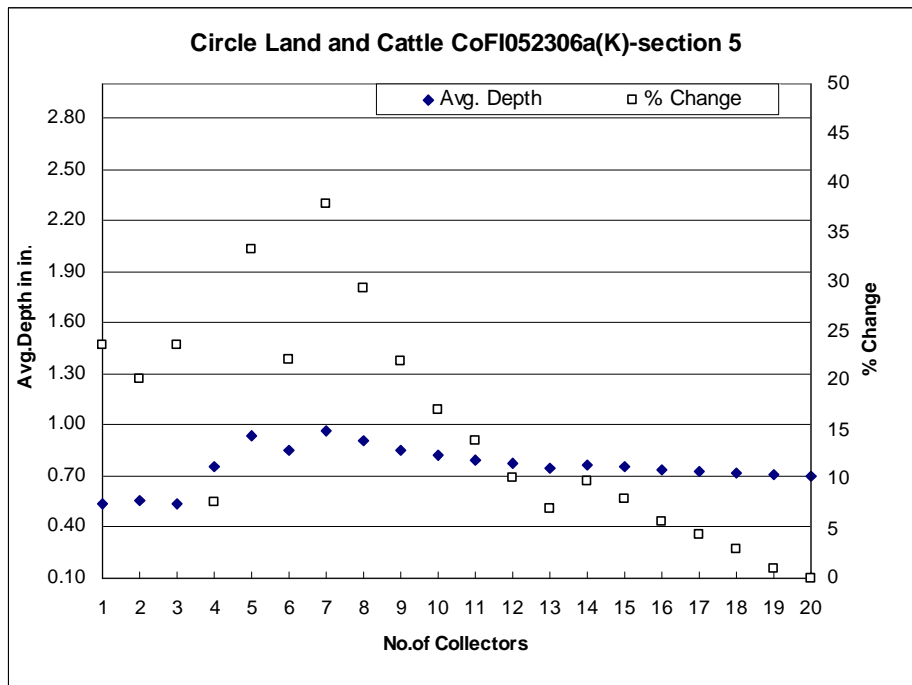
**Figure B.17.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-2 of the Circle Land and Cattle CoFI052306a(K)-section 15 irrigation system data set.



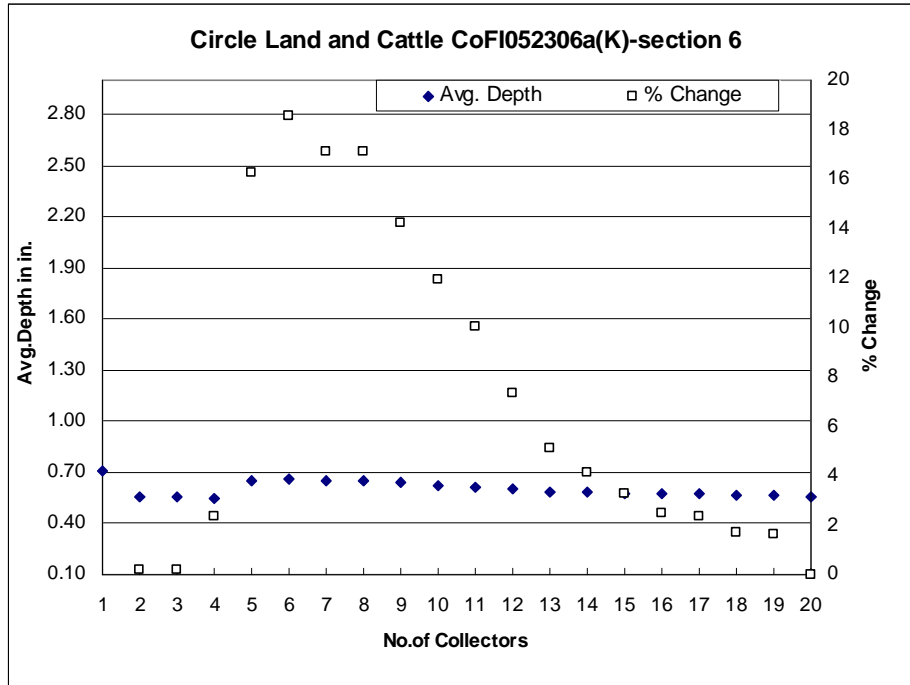
**Figure B.18.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-3 of the Circle Land and Cattle CoFI052306a(K)-section 15 irrigation system data set.



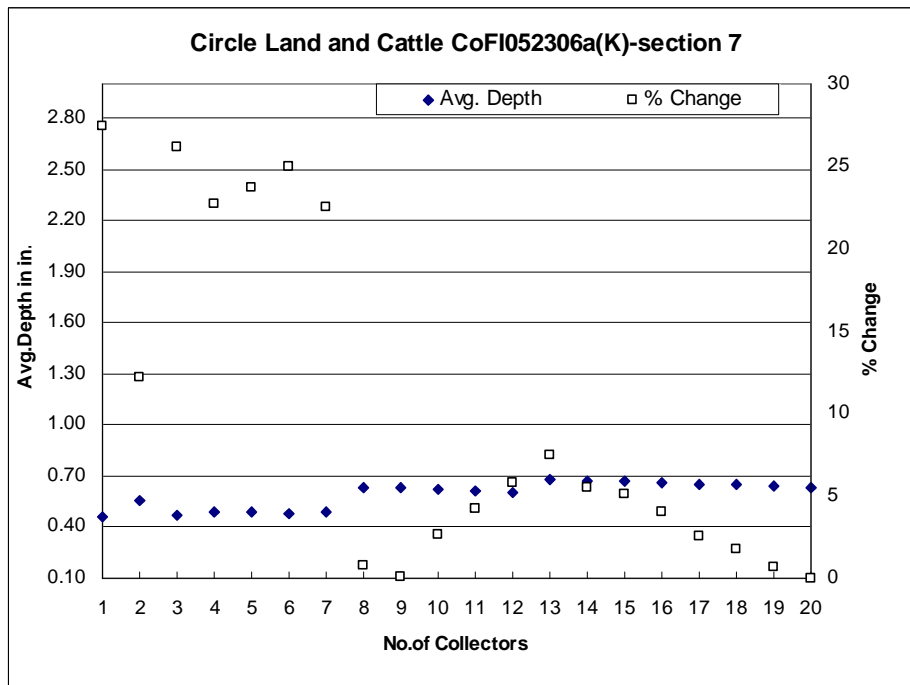
**Figure B.19.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-4 of the Circle Land and Cattle CoFI052306a(K)-section 15 irrigation system data set.



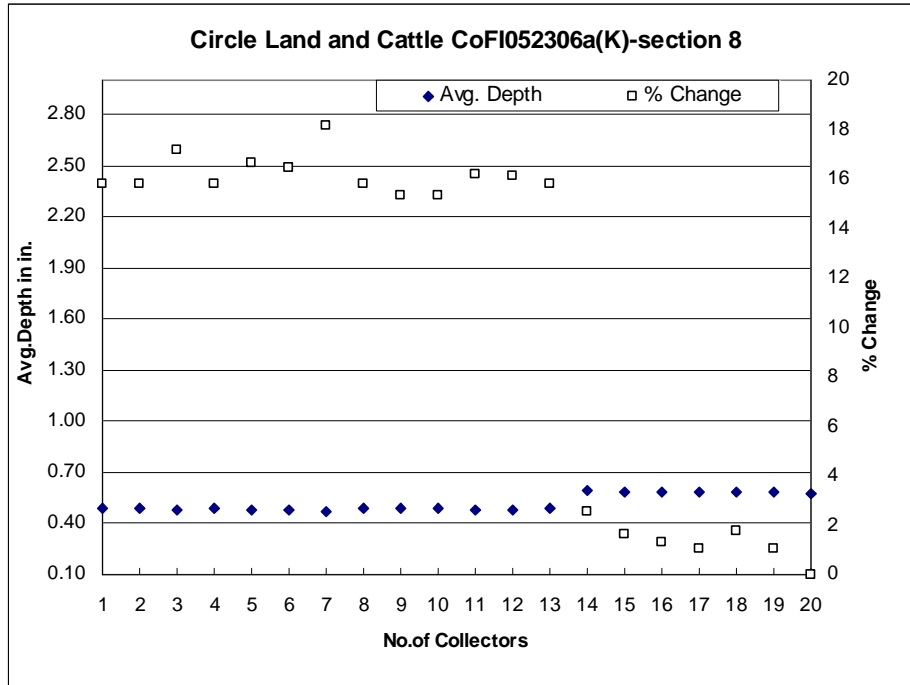
**Figure B.20.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-5 of the Circle Land and Cattle CoFI052306a(K)-section 15 irrigation system data set.



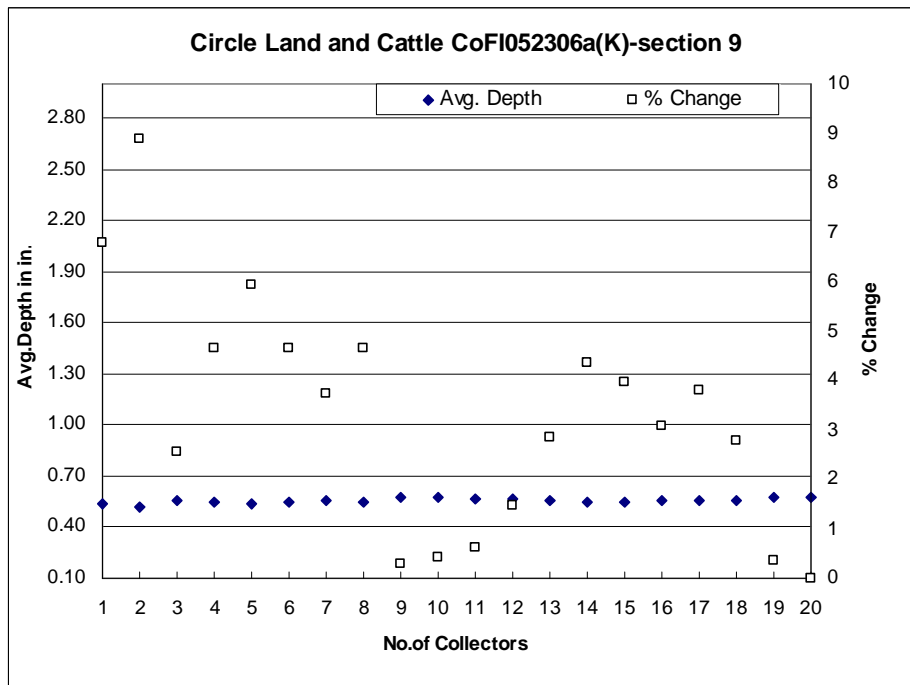
**Figure B.21.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-6 of the Circle Land and Cattle CoFI052306a(K)-section 152 irrigation system data set.



**Figure B.22.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-7 of the Circle Land and Cattle CoFI052306a(K)-section 15 irrigation system data set.

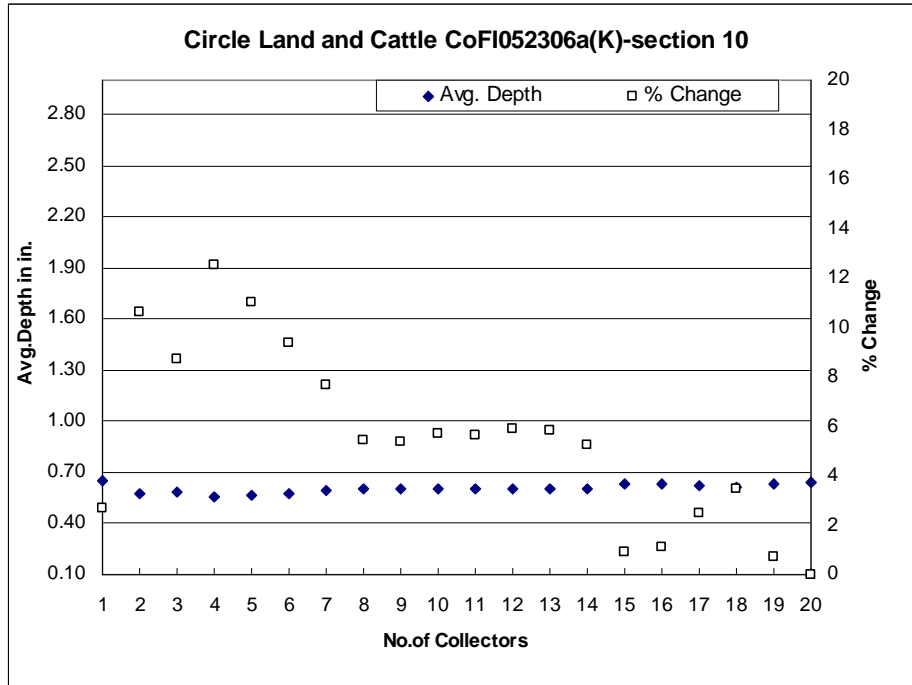


**Figure B.23.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-8 of the Circle Land and Cattle CoFI052306a(K)-section 15 irrigation system data set.

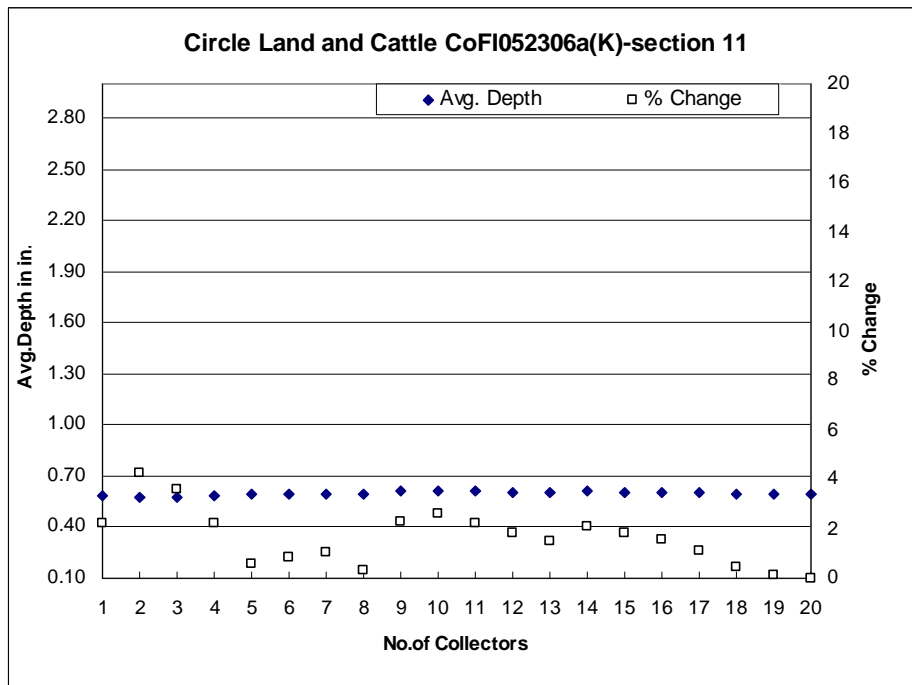


**Figure B.24.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-9 of the Circle Land and Cattle CoFI052306a(K)-section 15 irrigation system data set.

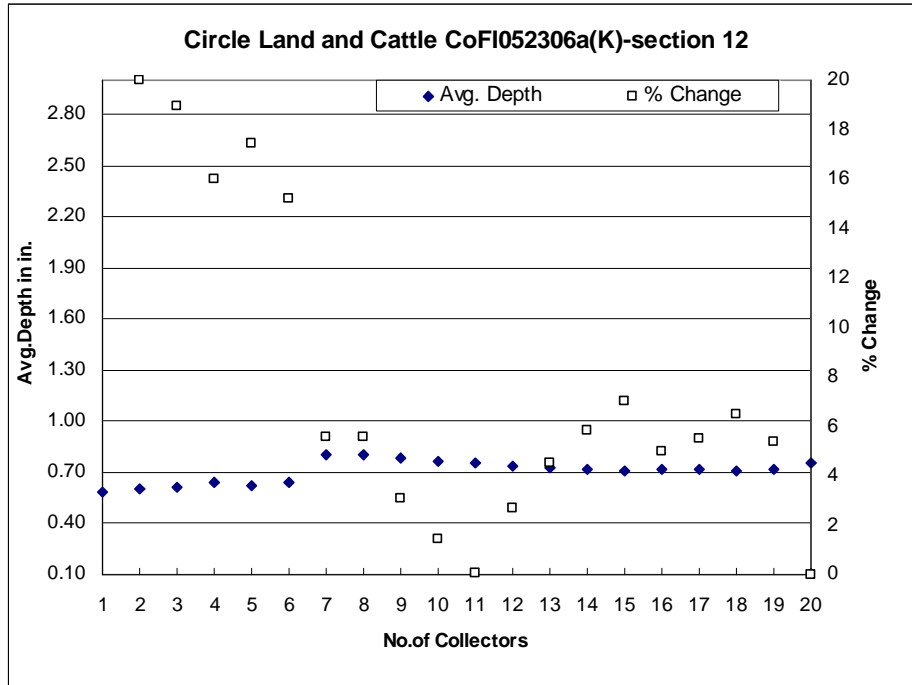




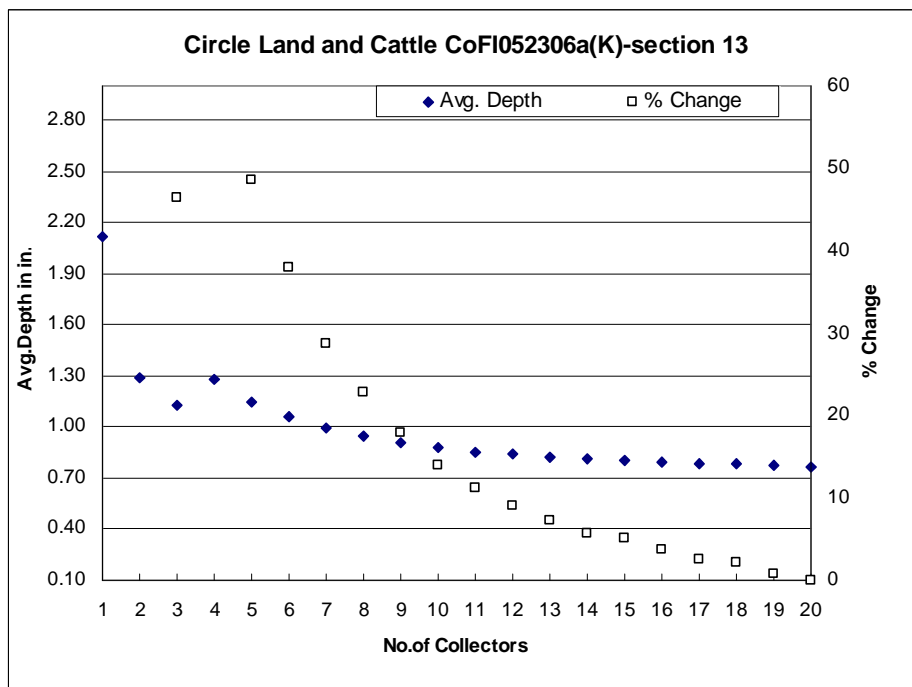
**Figure B.25.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-10 of the Circle Land and Cattle CoFI052306a(K)-section 15 irrigation system data set.



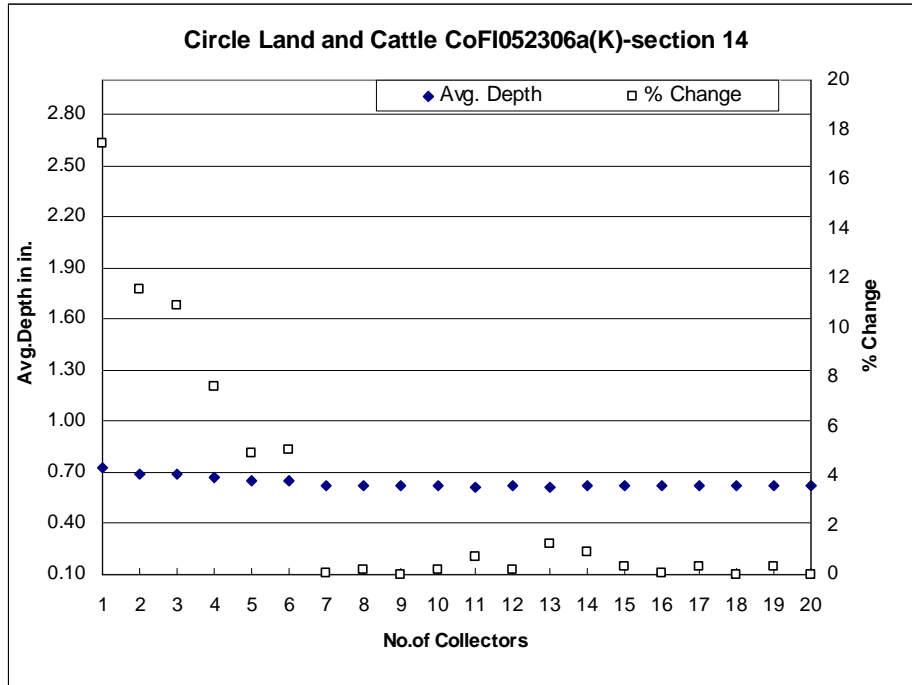
**Figure B.26.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-11 of the Circle Land and Cattle CoFI052306a(K)-section 15 irrigation system data set.



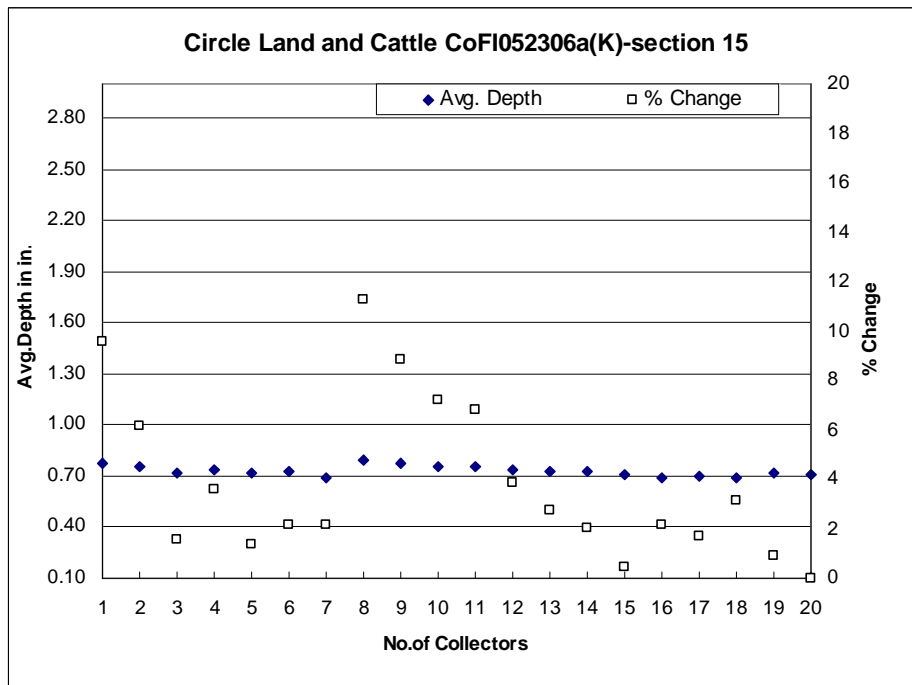
**Figure B.27.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-12 of the Circle Land and Cattle CoFI052306a(K)-section 15irrigation system data set.



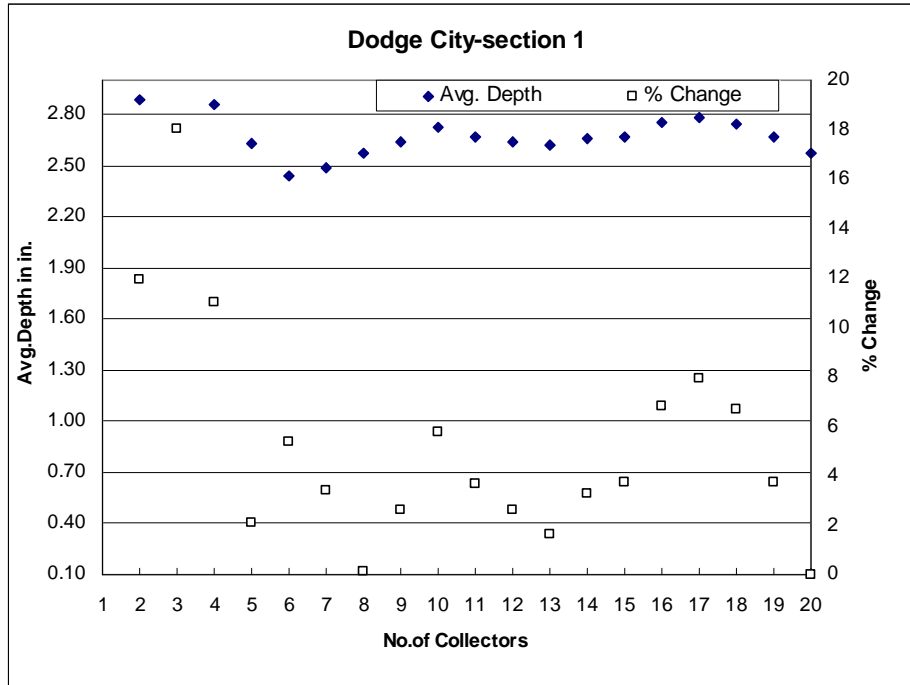
**Figure B.28.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-13 of the Circle Land and Cattle CoFI052306a(K)-section 15irrigation system data set.



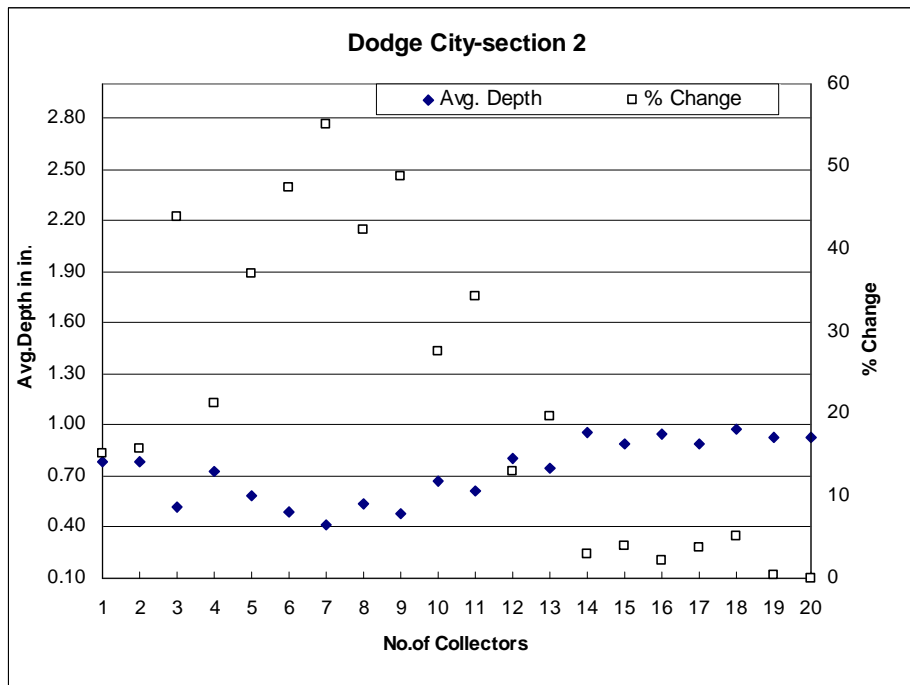
**Figure B.29.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-14 of the Circle Land and Cattle CoFI052306a(K)-section 15 irrigation system data set.



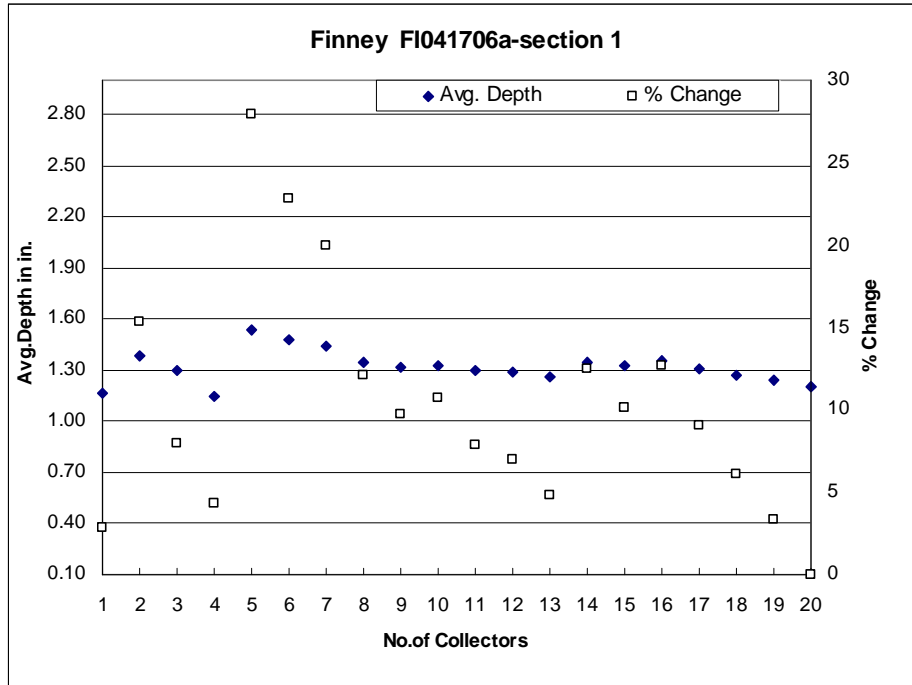
**Figure B.30.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-15 of the Circle Land and Cattle CoFI052306a(K)-section 15 irrigation system data set.



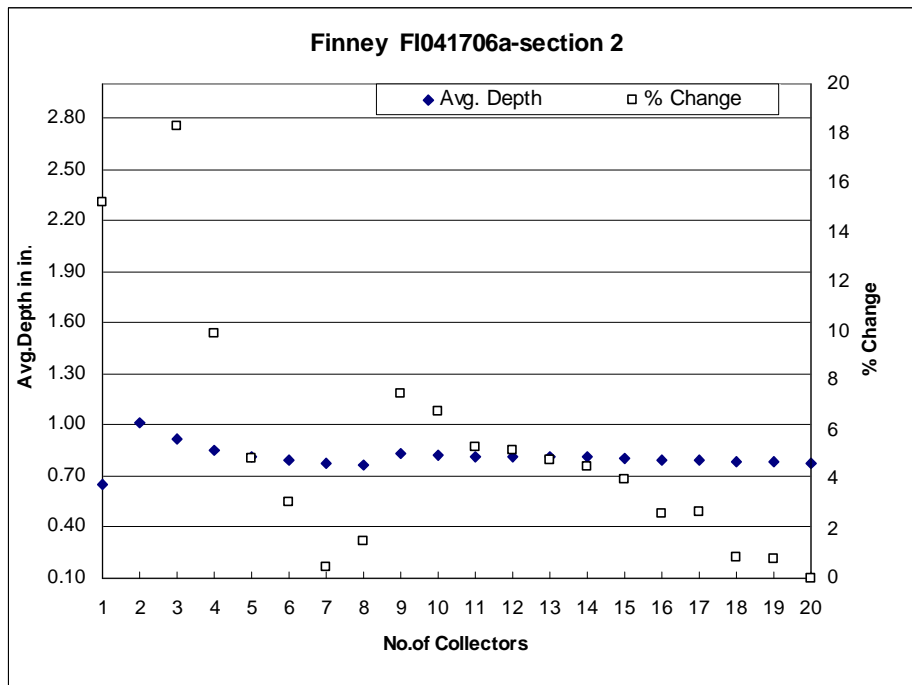
**Figure B.31.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-1 of the Dodge City irrigation system data set.



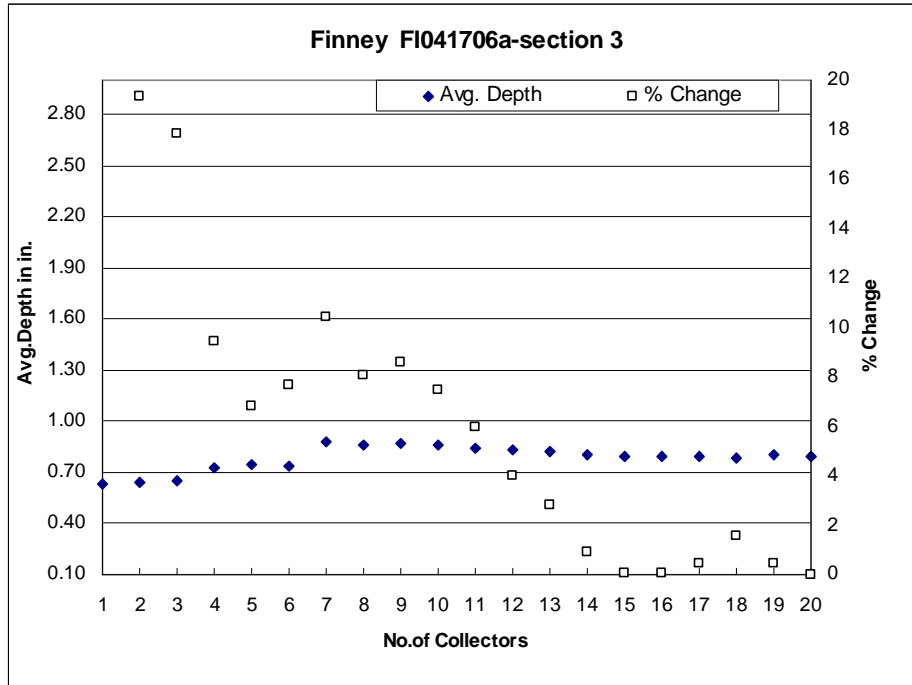
**Figure B.32.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-2 of the Dodge City irrigation system data set.



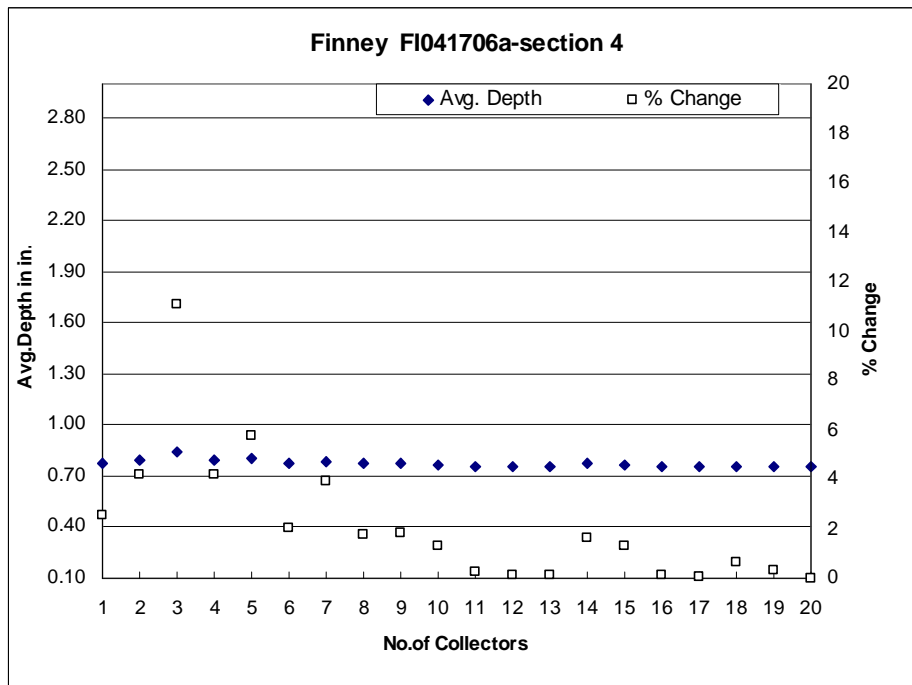
**Figure B.33.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-1 of the Finney FI041706a. irrigation system data set.



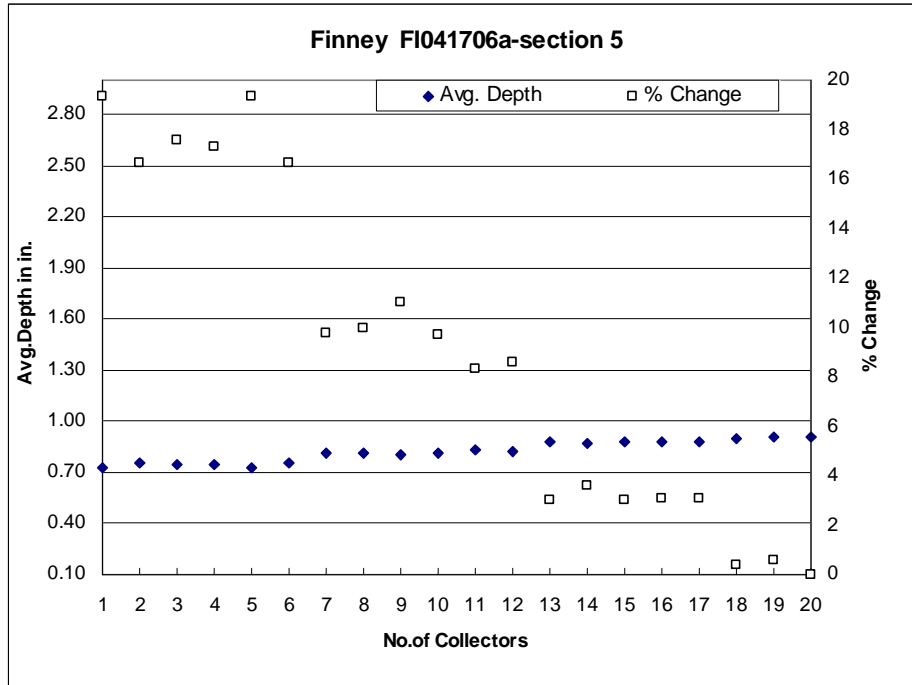
**Figure B.34.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-2 of the Finney FI041706a. irrigation system data set.



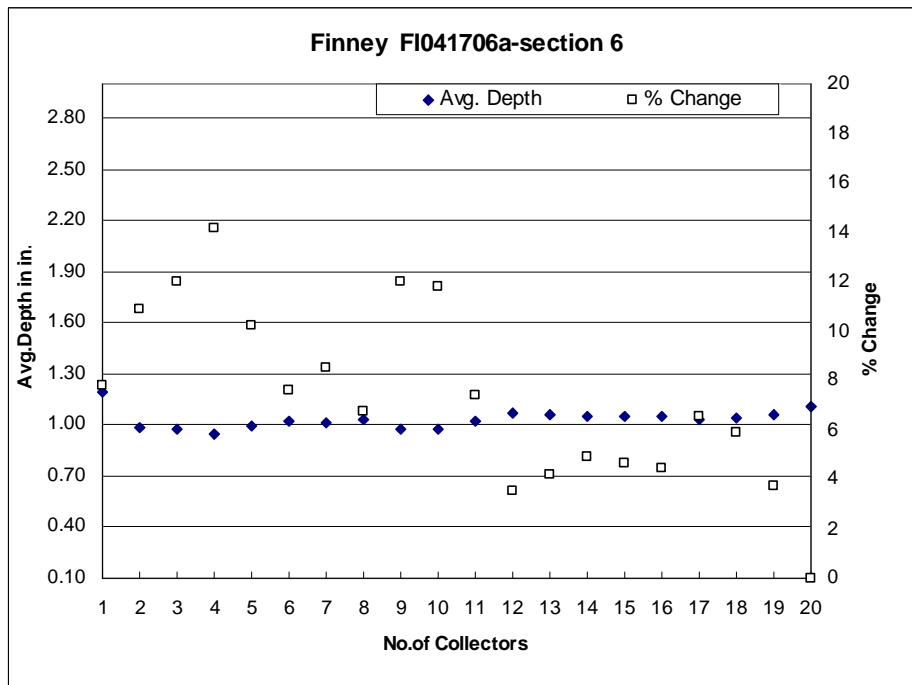
**Figure B.35.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-3 of the Finney FI041706a.irrigation system data set.



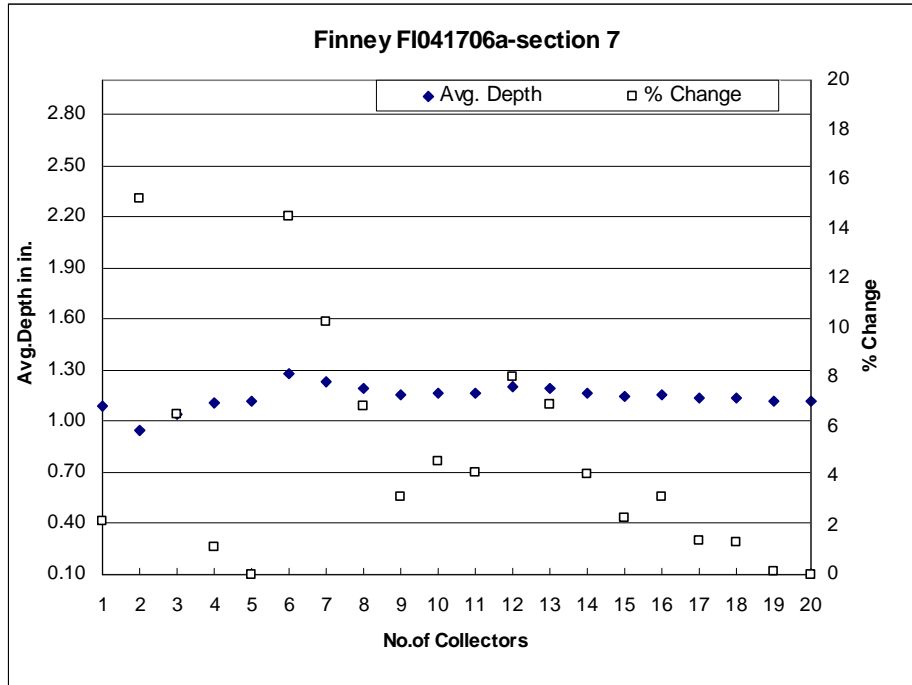
**Figure B.36.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-4 of the Finney FI041706a irrigation system data set.



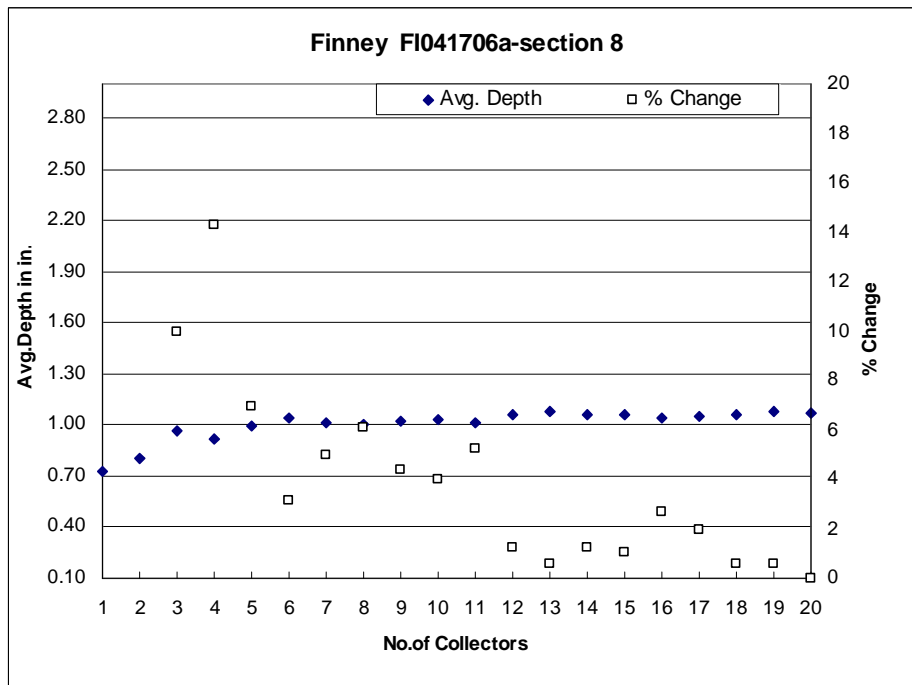
**Figure B.37.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-5 of the Finney FI041706a irrigation system data set.



**Figure B.38.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-6 of the Finney FI041706a irrigation system data set.

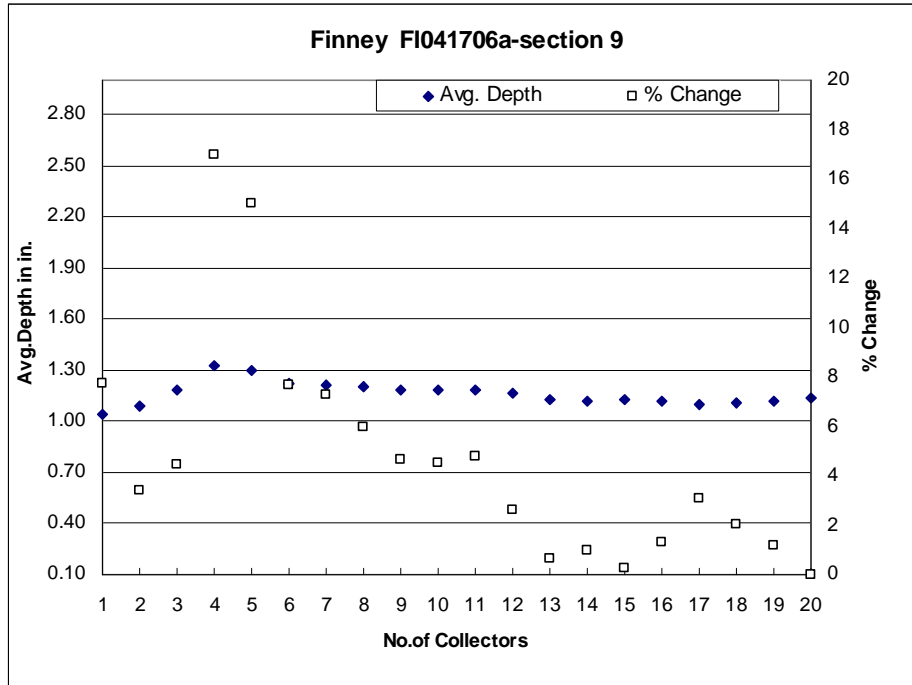


**Figure B.39.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-7 of the Finney FI041706a irrigation system data set.

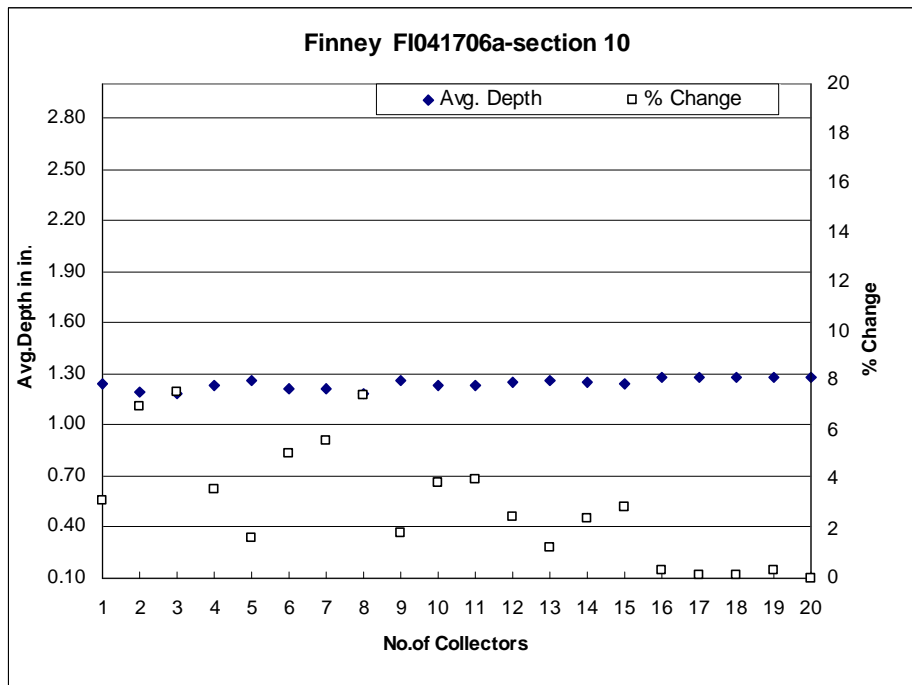


**Figure B.40.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-8 of the Finney FI041706a irrigation system data set.

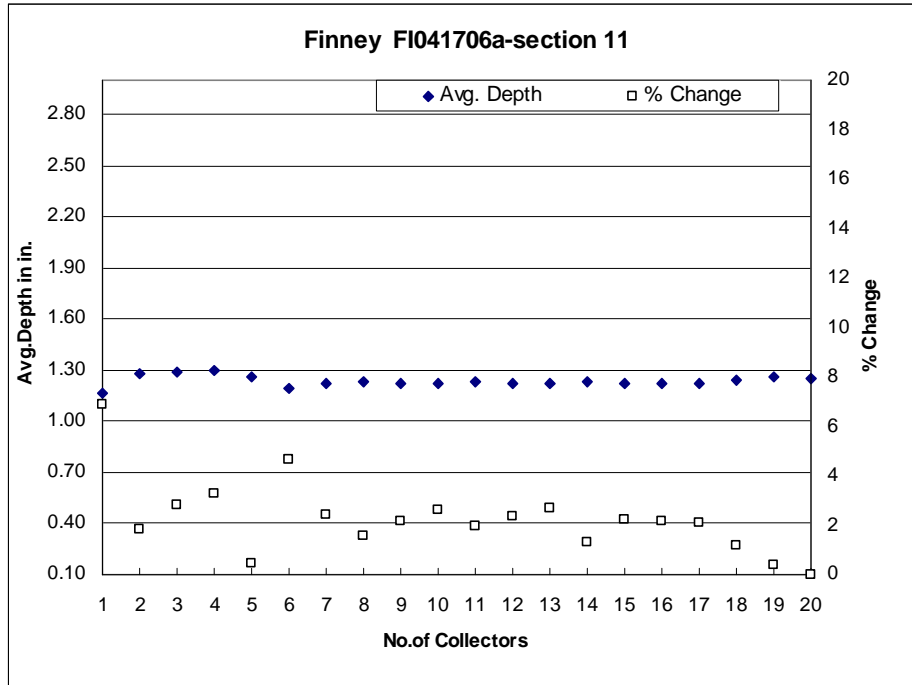




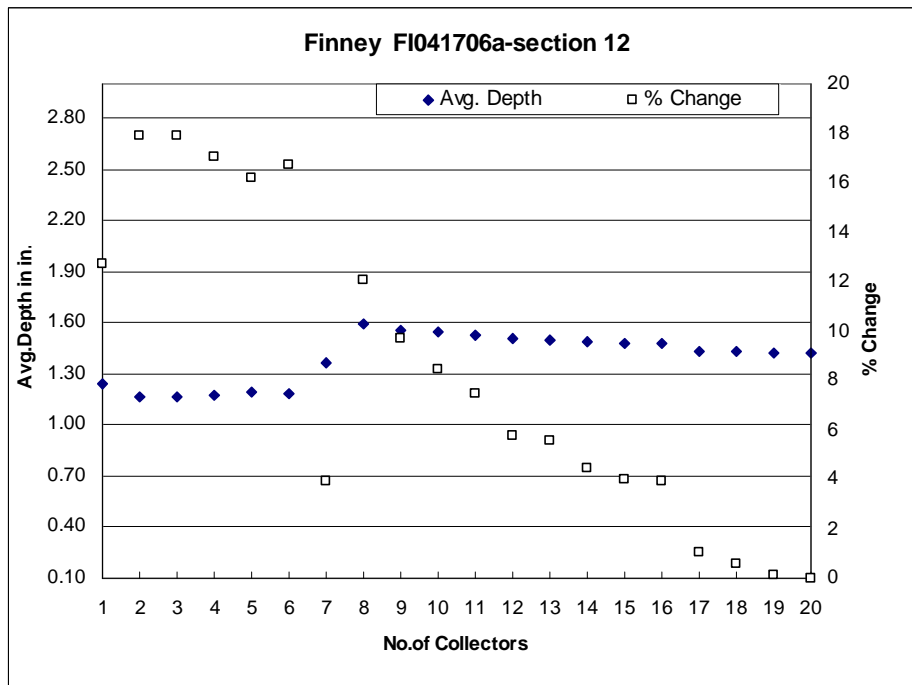
**Figure B.41.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-9 of the Finney FI041706a irrigation system data set.



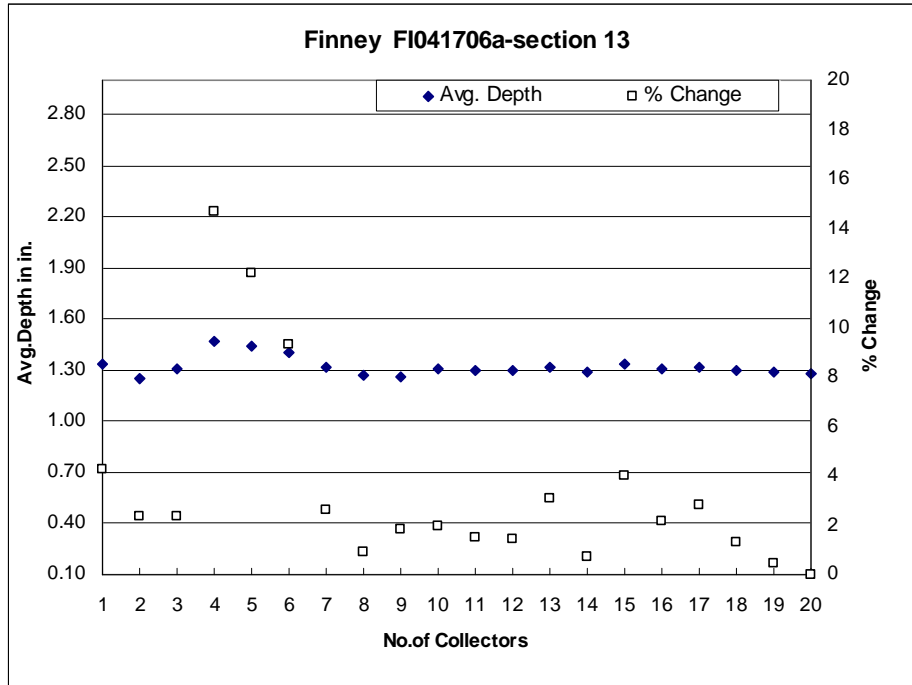
**Figure B.42.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-10 of the Finney FI041706a irrigation system data set.



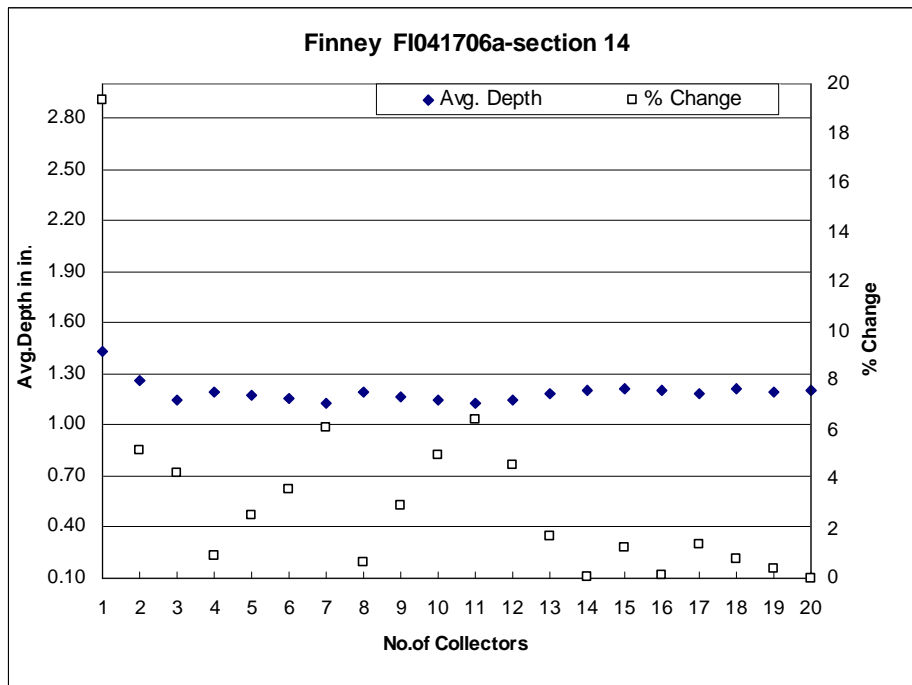
**Figure B.43.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-11 of the Finney FI041706a irrigation system data set.



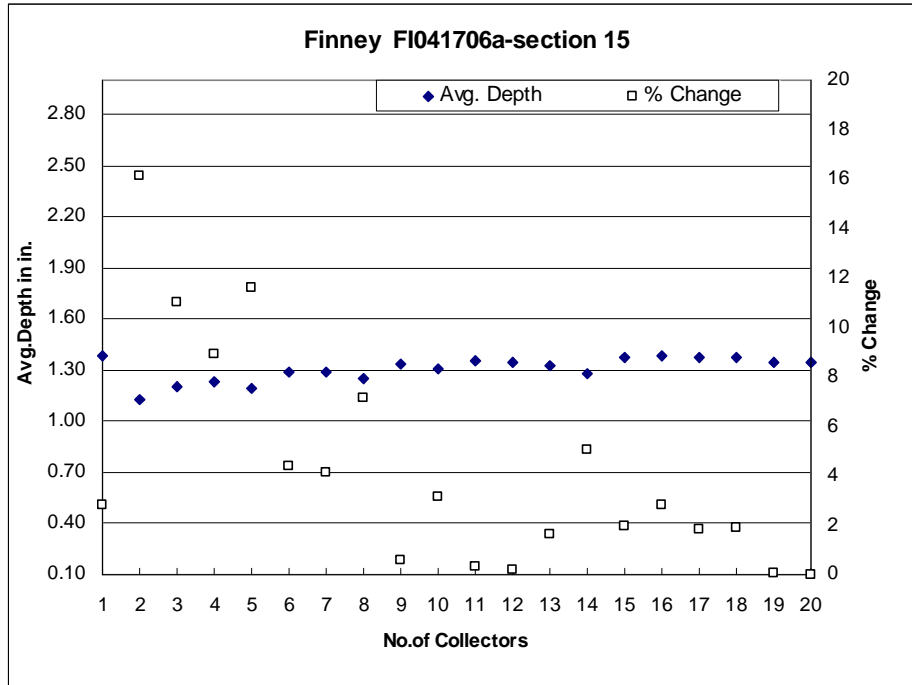
**Figure B.44.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-12 of the Finney FI041706a irrigation system data set.



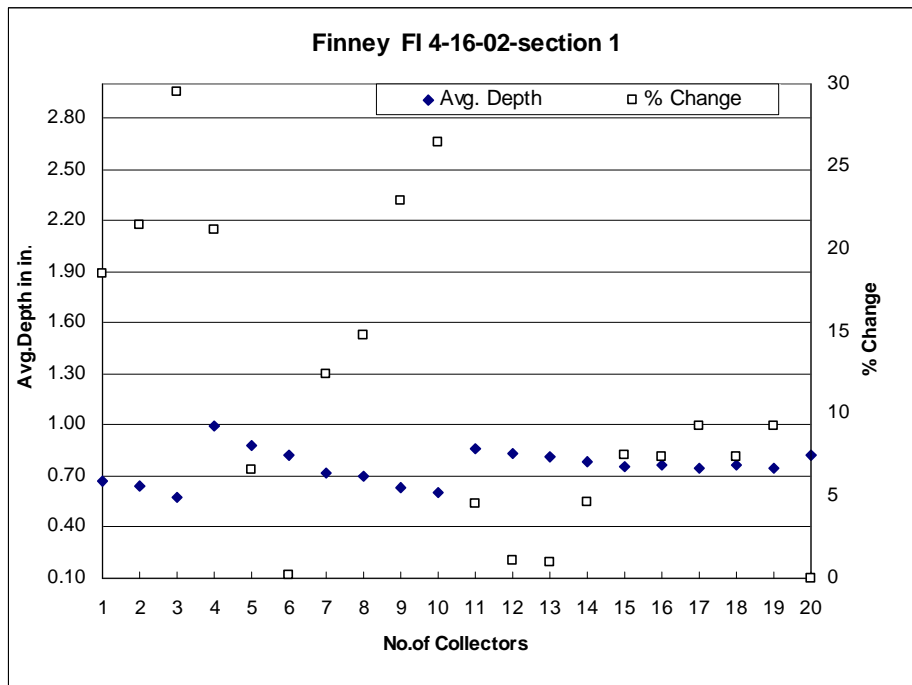
**Figure B.45.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-13 of the Finney FI041706a irrigation system data set.



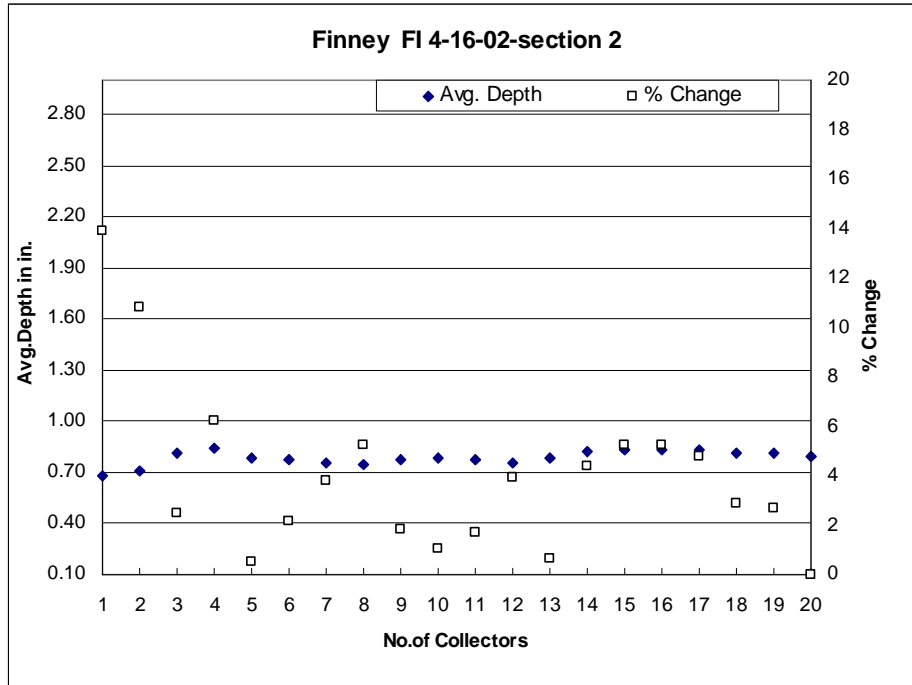
**Figure B.46.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-14 of the Finney FI041706a irrigation system data set.



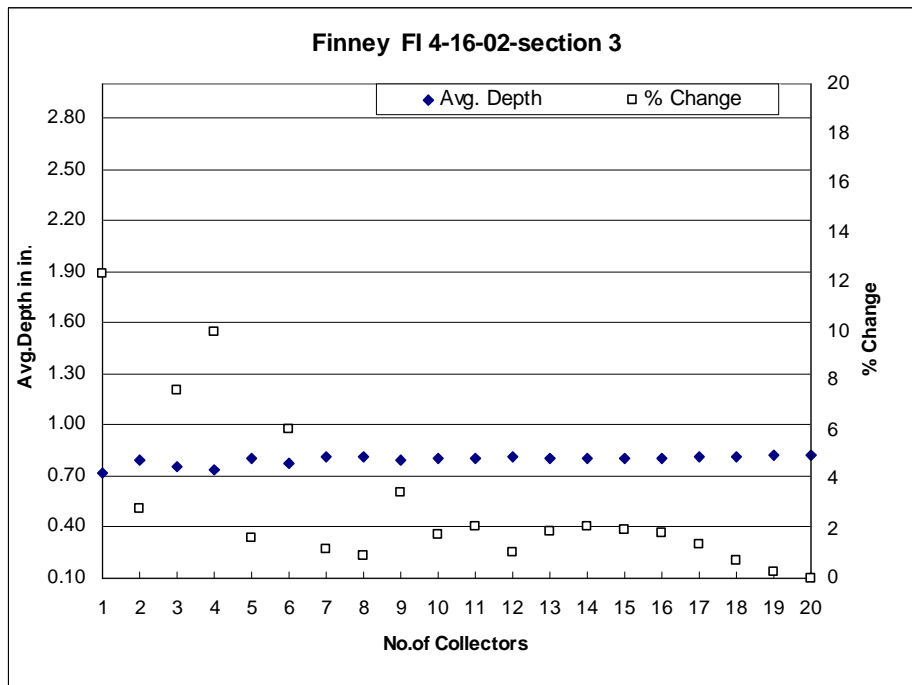
**Figure B.47.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-15 of the Finney FI041706a irrigation system data set.



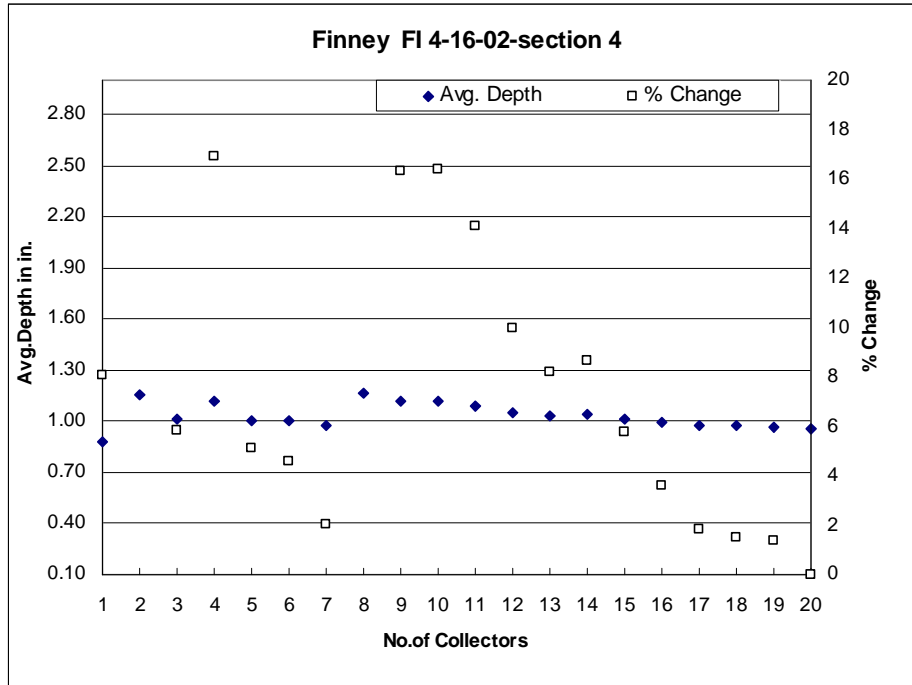
**Figure B.48.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-1 of the Finney FI 4-16-02 irrigation system data set.



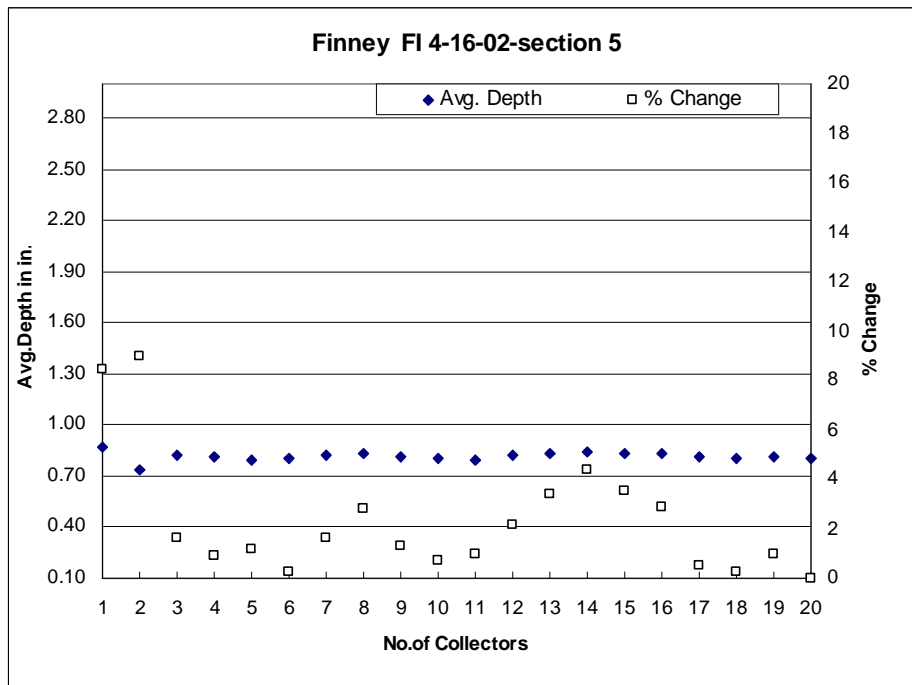
**Figure B.49.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-2 of the Finney FI 4-16-02 irrigation system data set.



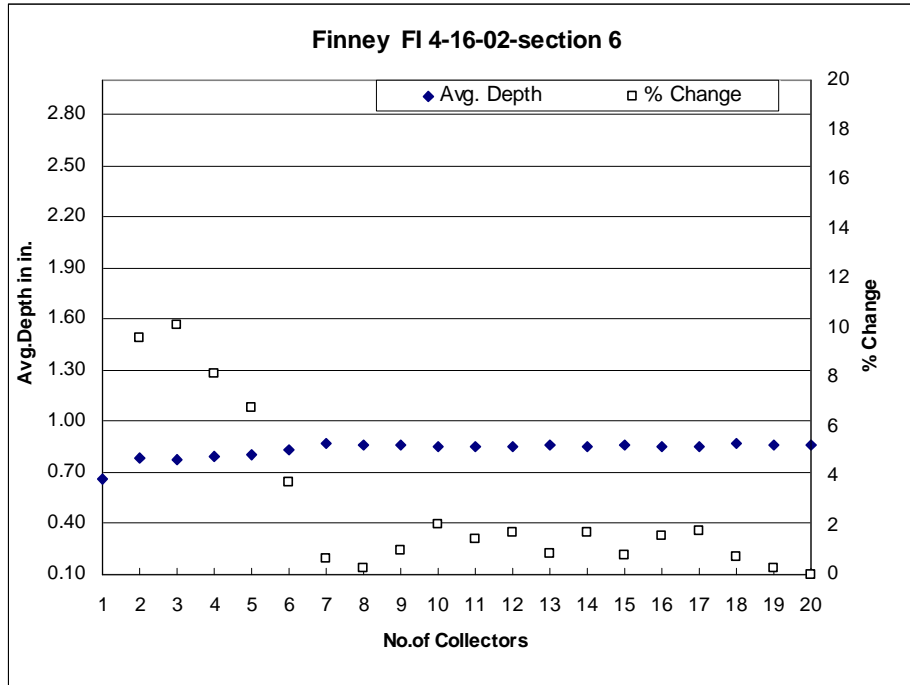
**Figure B.50.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-3 of the Finney FI 4-16-02 irrigation system data set.



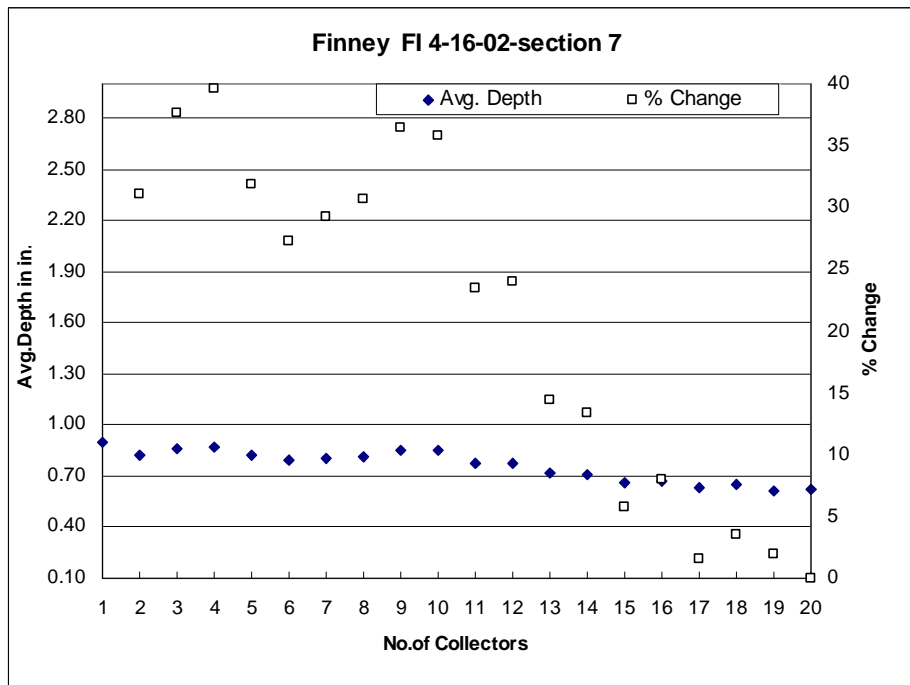
**Figure B.51.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-4 of the Finney FI 4-16-02 irrigation system data set.



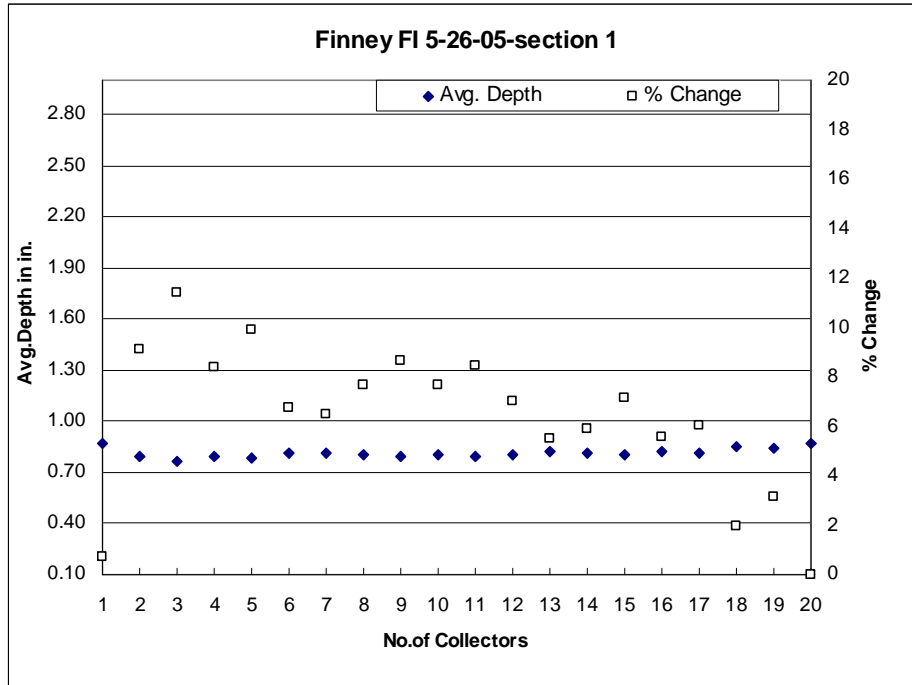
**Figure B.52.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-5 of the Finney FI 4-16-02 irrigation system data set.



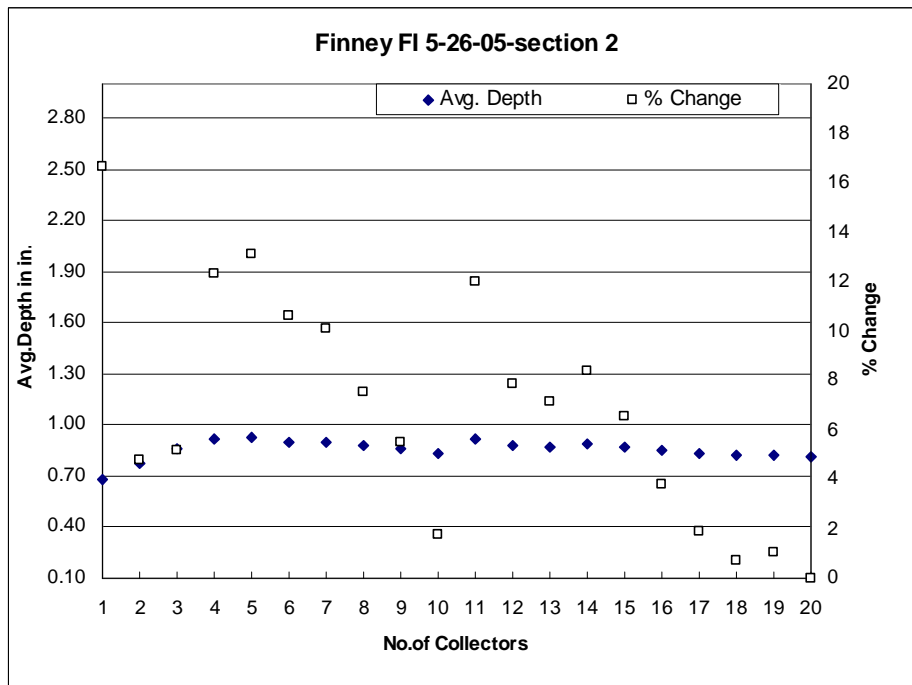
**Figure B.53.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-6 of the Finney FI 4-16-02 irrigation system data set.



**Figure B.54.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-7 of the Finney FI 4-16-02 irrigation system data set.

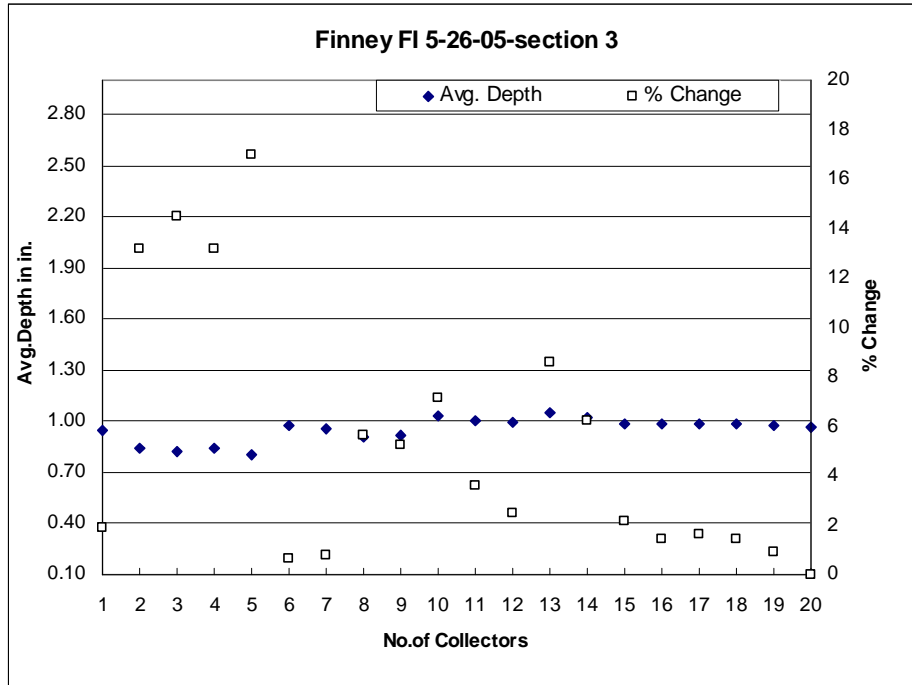


**Figure B.55.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-1 of the Finney FI 5-26-05 irrigation system data set.

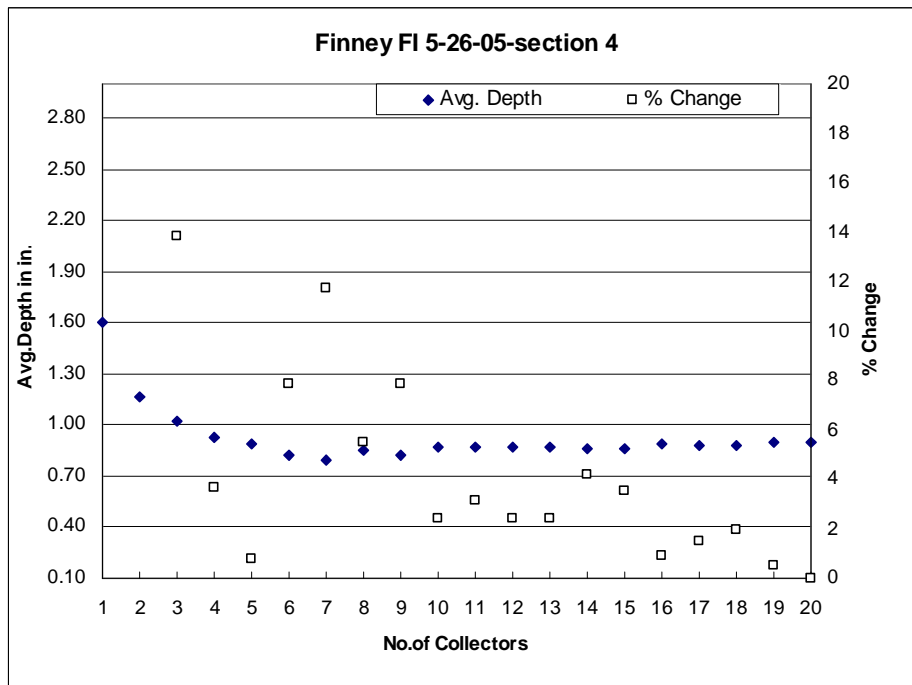


**Figure B.56.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-2 of the Finney FI 5-26-05 irrigation system data set.

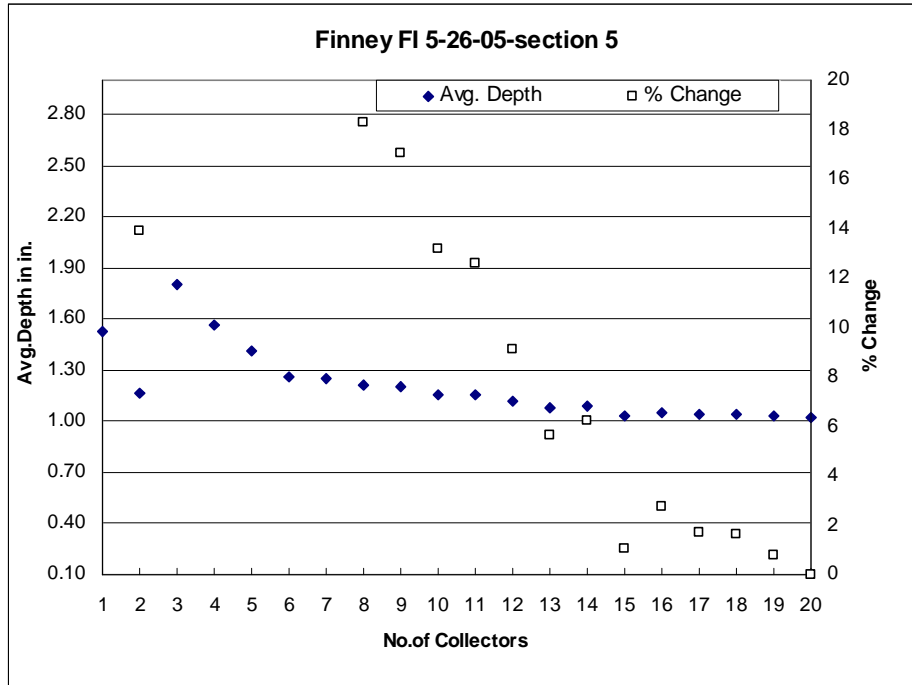




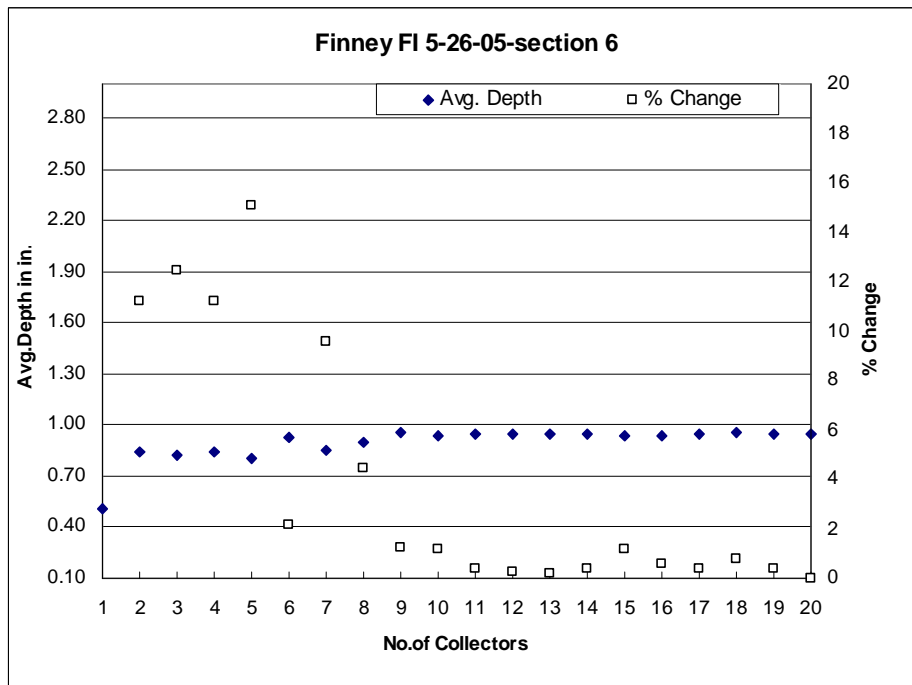
**Figure B.57.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-3 of the Finney FI 5-26-05 irrigation system data set.



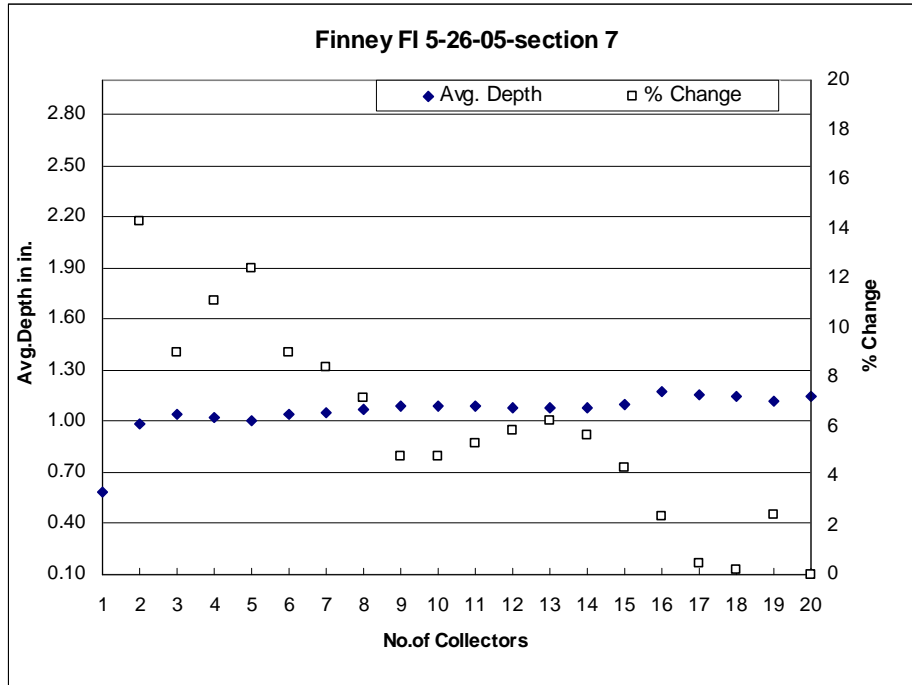
**Figure B.58.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-4 of the Finney FI 5-26-05 irrigation system data set.



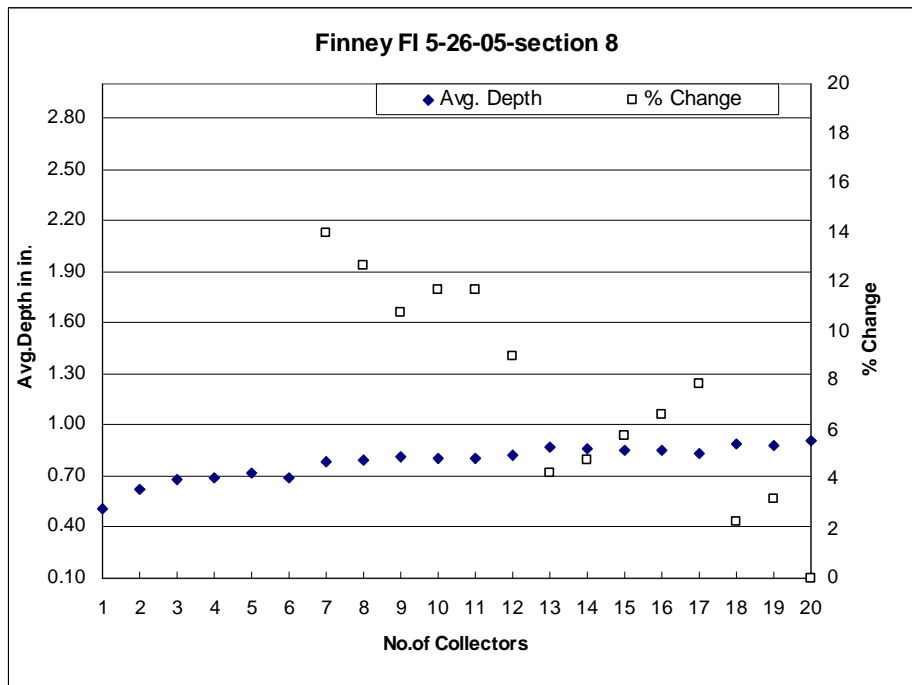
**Figure B.59.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-5 of the Finney FI 5-26-05 irrigation system data set.



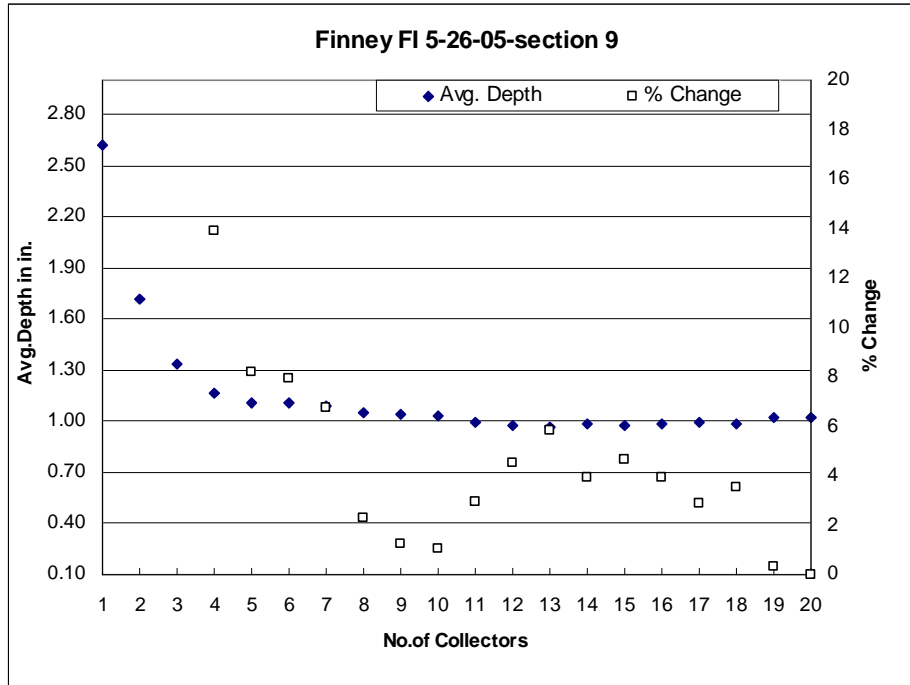
**Figure B.60.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-6 of the Finney FI 5-26-05 irrigation system data set.



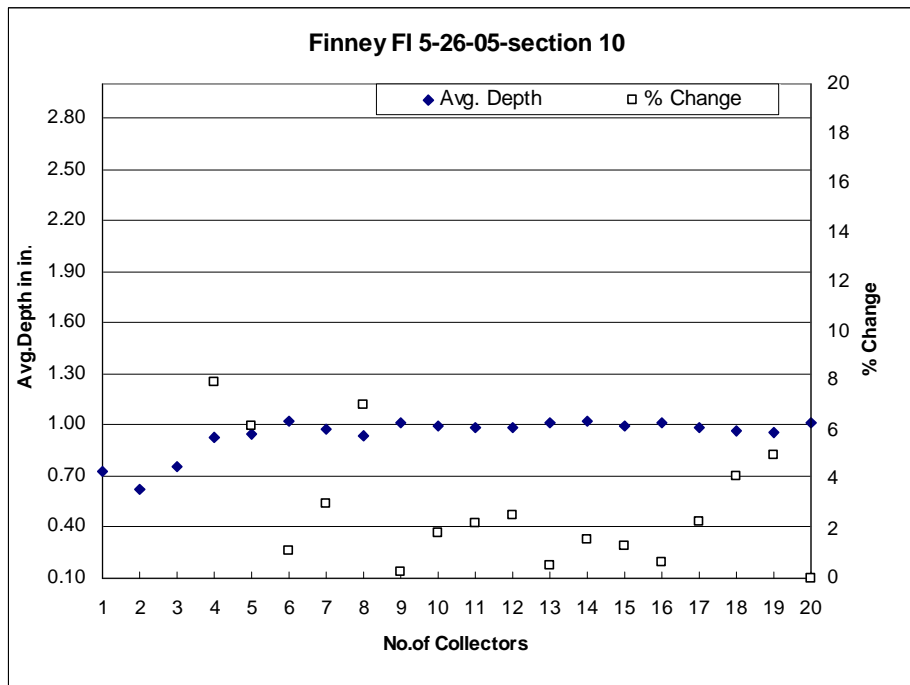
**Figure B.61.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-7 of the Finney FI 5-26-05 irrigation system data set.



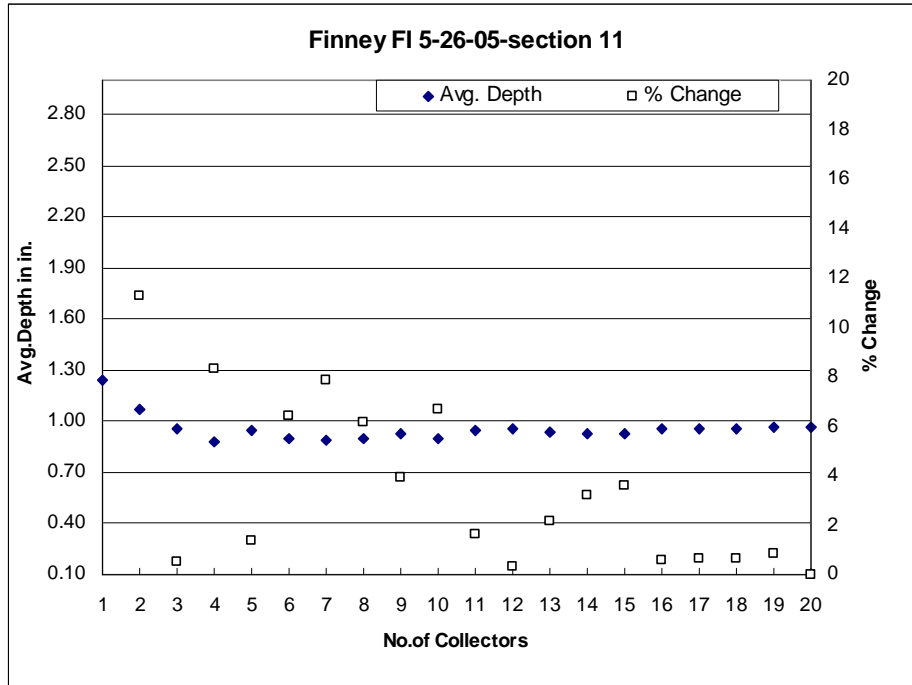
**Figure B.62.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-8 of the Finney FI 5-26-05 irrigation system data set.



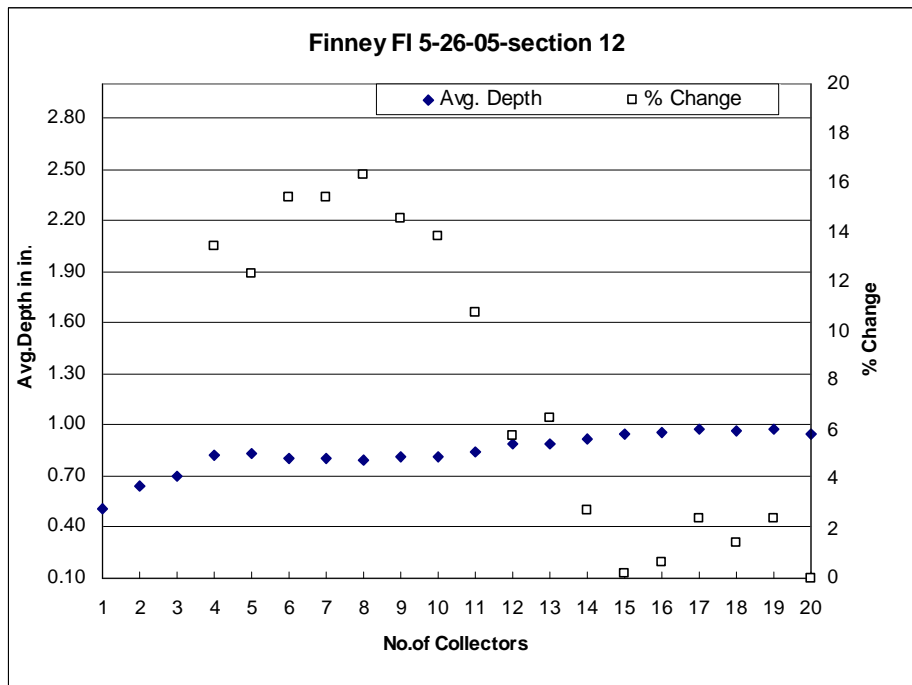
**Figure B.63.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-9 of the Finney FI 5-26-05 irrigation system data set.



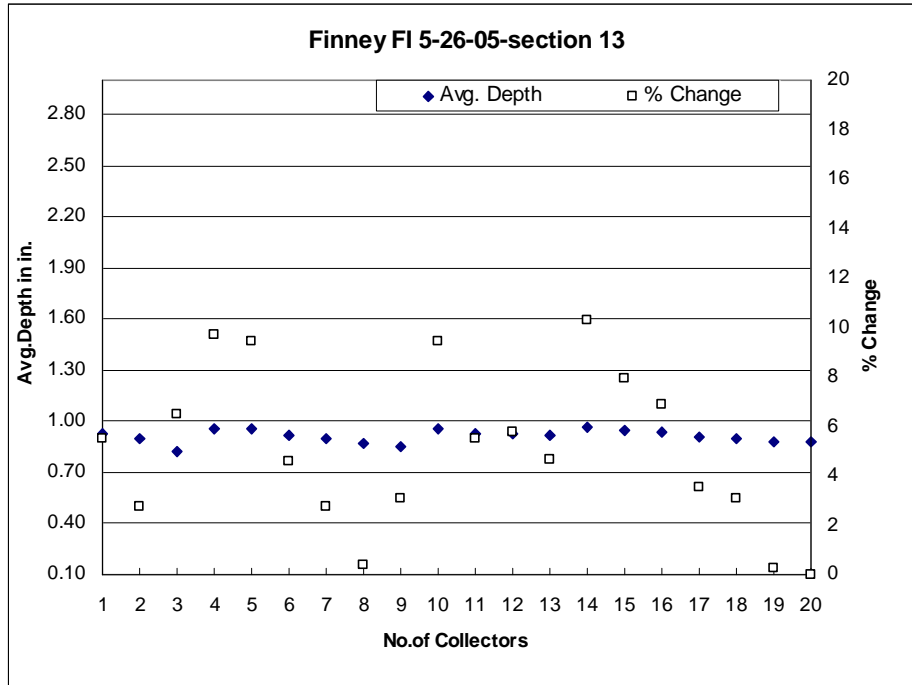
**Figure B.64.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-10 of the Finney FI 5-26-05 irrigation system data set.



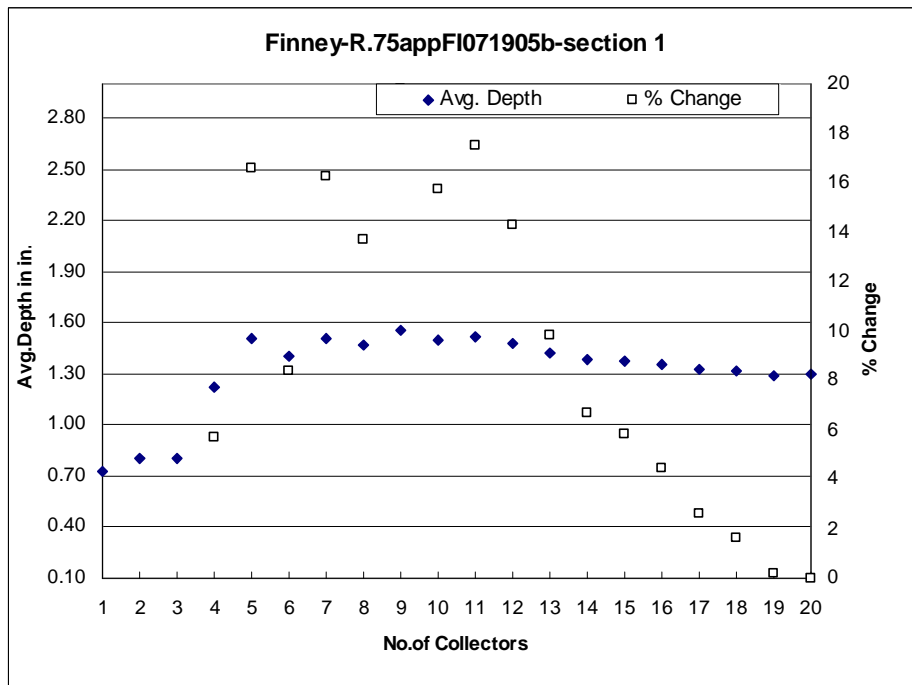
**Figure B.65.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-11 of the Finney FI 5-26-05 irrigation system data set.



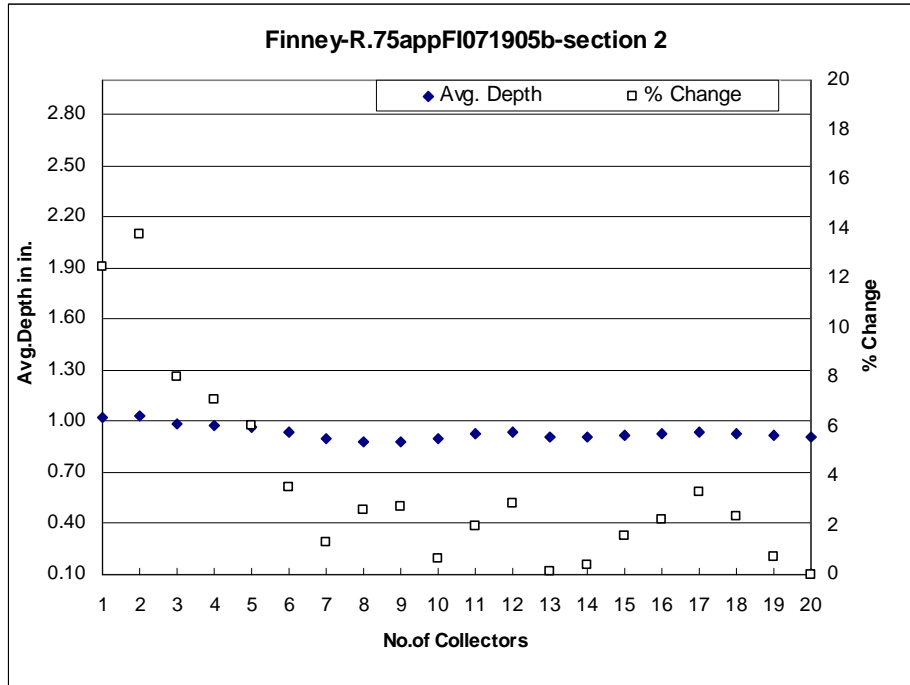
**Figure B.66.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-12 of the Finney FI 5-26-05 irrigation system data set.



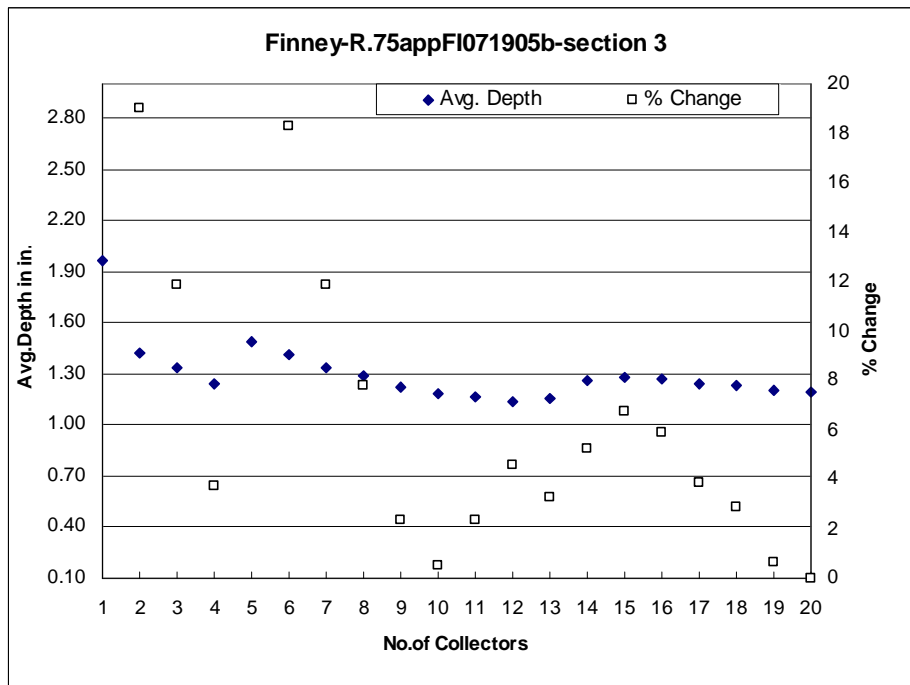
**Figure B.67.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-13 of the Finney FI 5-26-05 irrigation system data set.



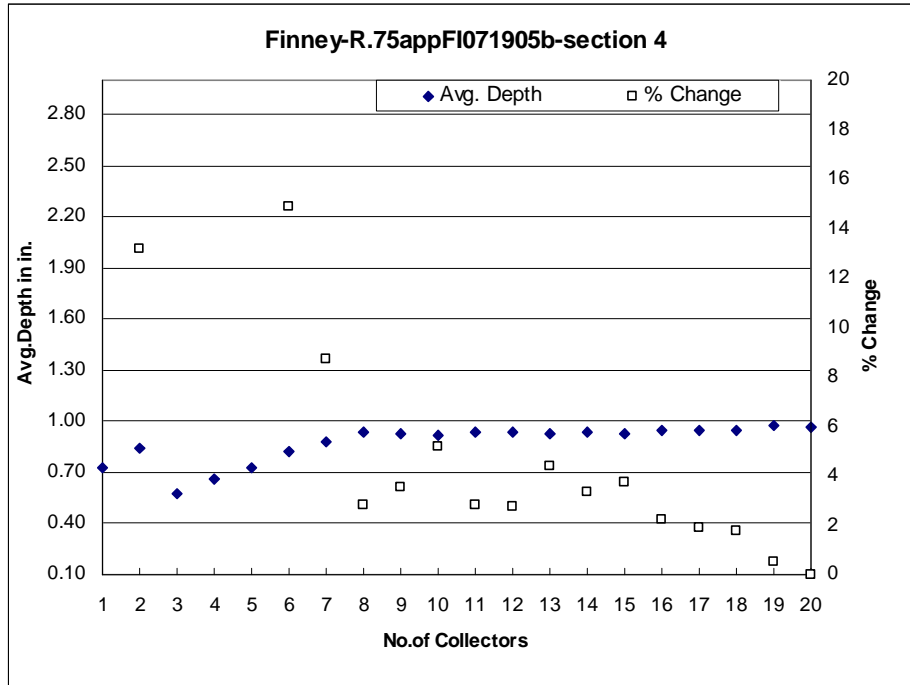
**Figure B.68.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-1 of the Finney-R.75appFI071905b irrigation system data set.



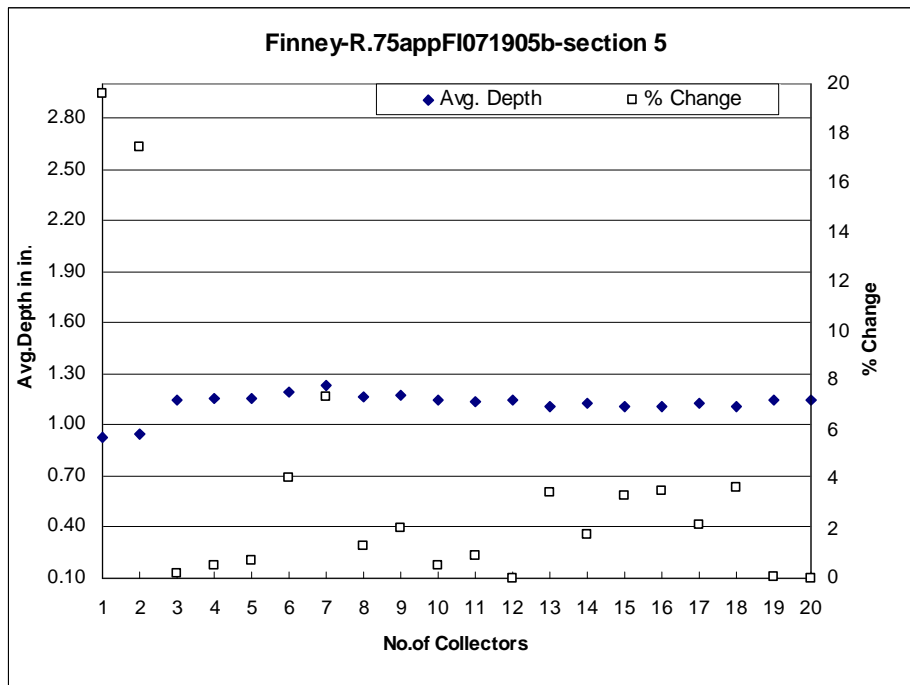
**Figure B.69.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-2 of the Finney-R.75appFI071905b irrigation system data set.



**Figure B.70.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-3 of the Finney-R.75appFI071905b irrigation system data set.

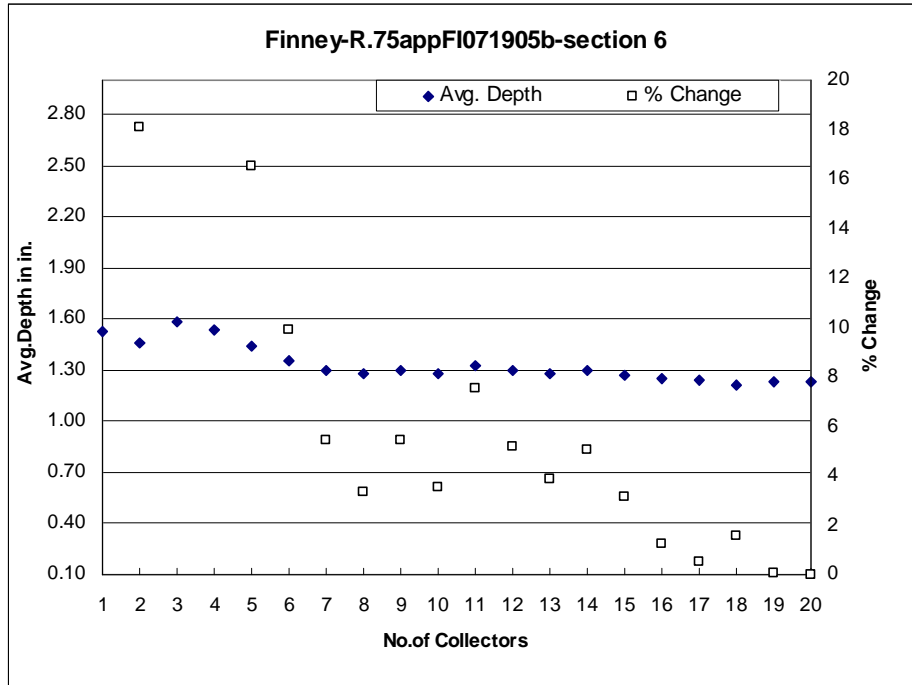


**Figure B.71.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ...1) from the base set of 20 collectors for section-4 of Finney-R.75appFI071905b irrigation system data set.

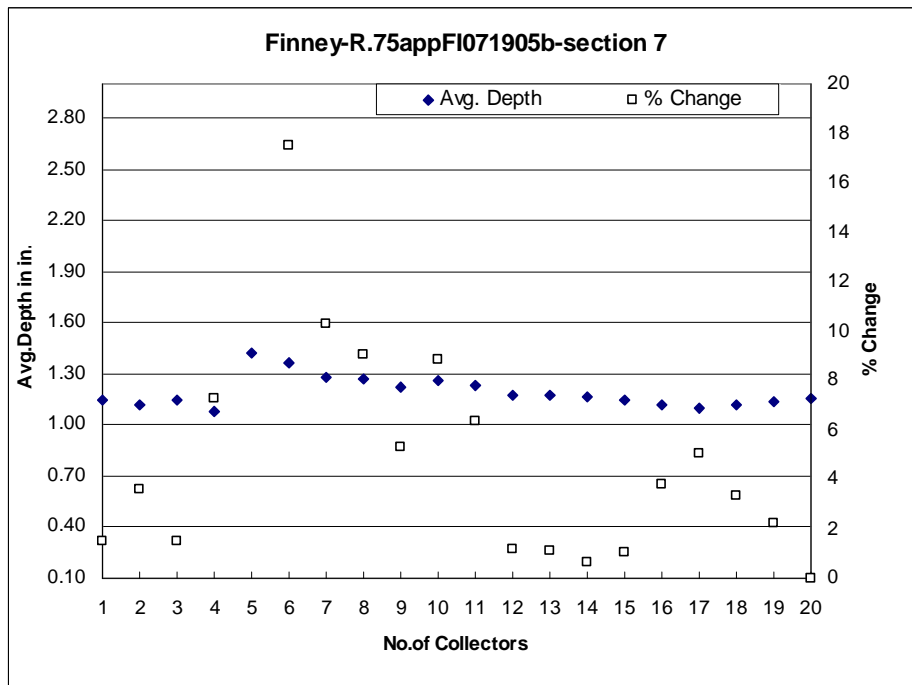


**Figure B.72.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-5 of the Finney-R.75appFI071905b irrigation system data set.

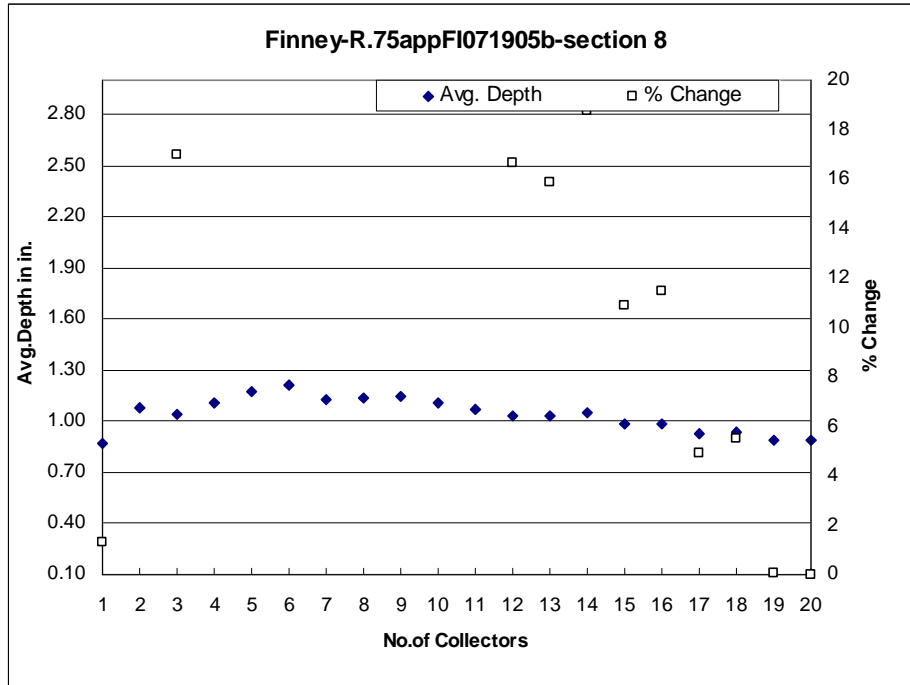




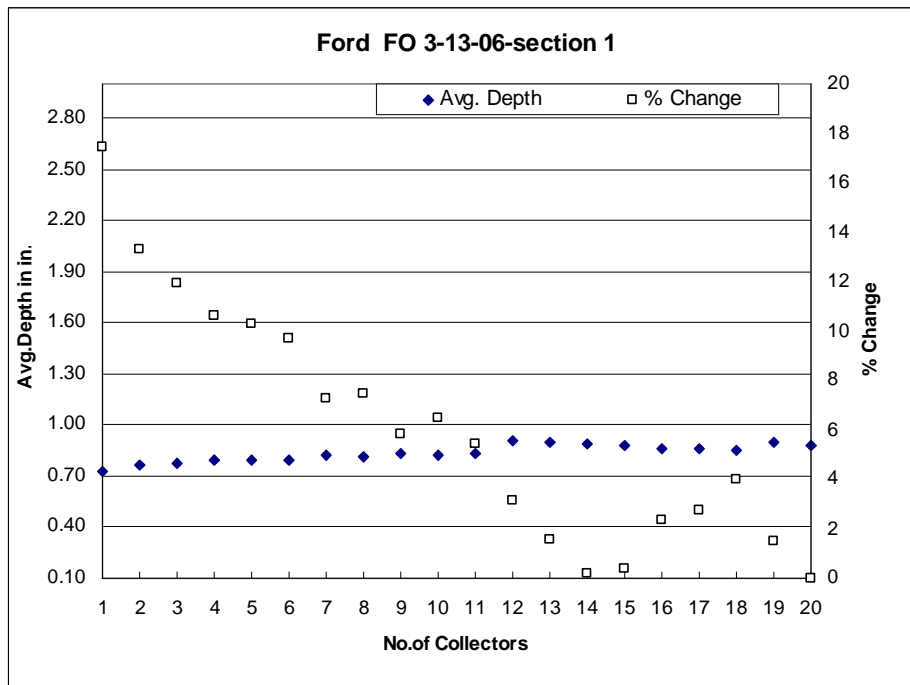
**Figure B.73.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-6 of the Finney-R.75appFI071905b irrigation system data set.



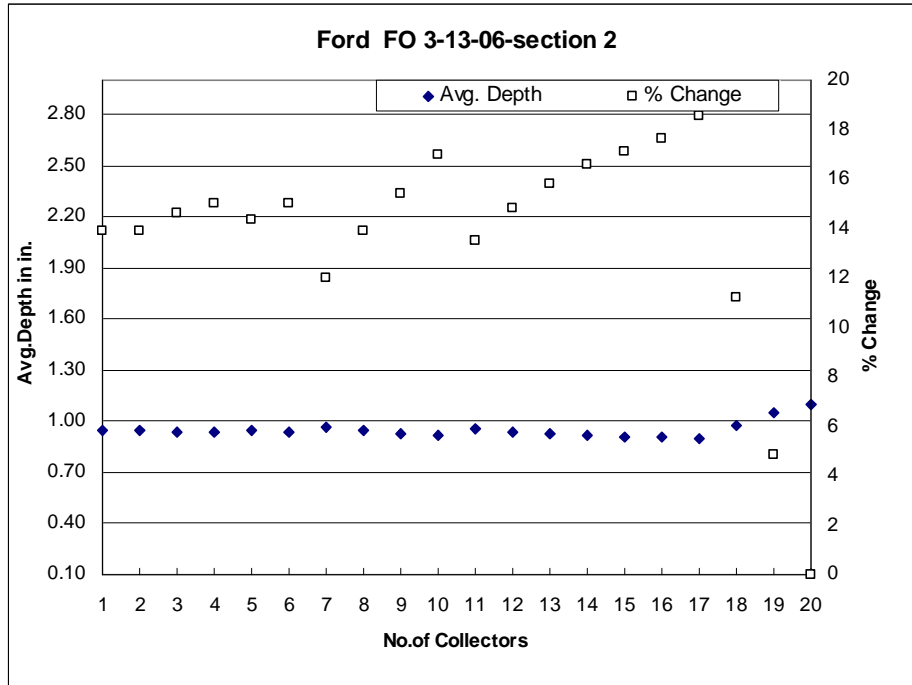
**Figure B.74.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-7 of the Finney-R.75appFI071905b irrigation system data set.



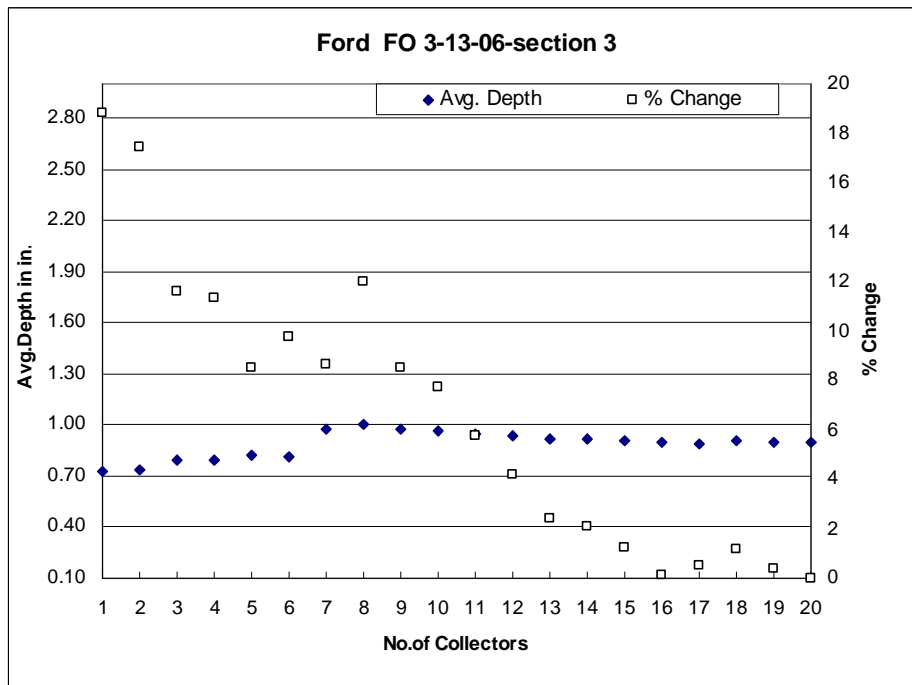
**Figure B.75.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-8 of the Finney-R.75appFI071905b 02 irrigation system data set.



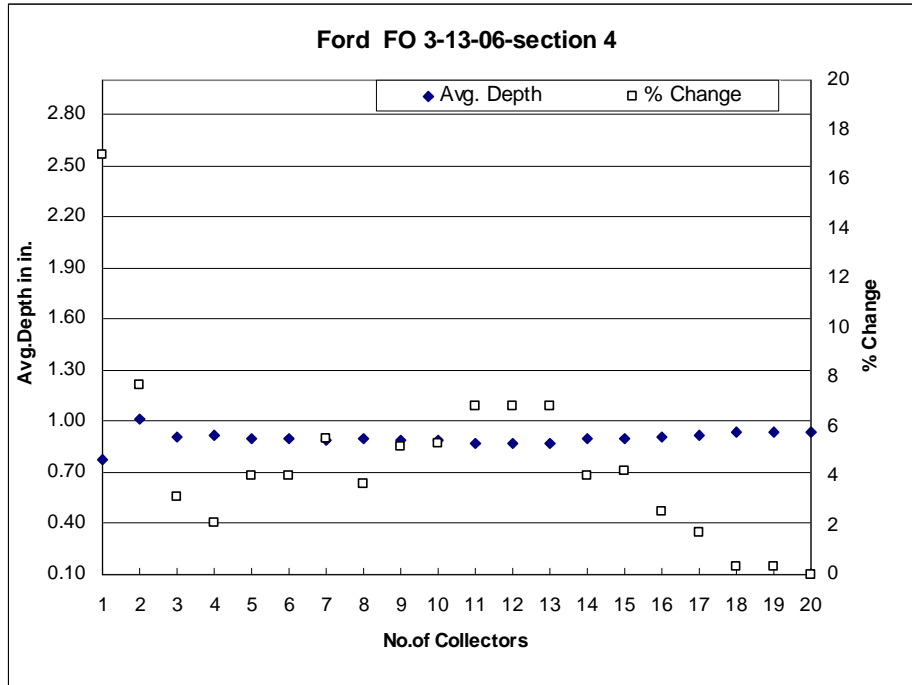
**Figure B.76.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-1 of the Ford FO 3-13-06 irrigation system data set.



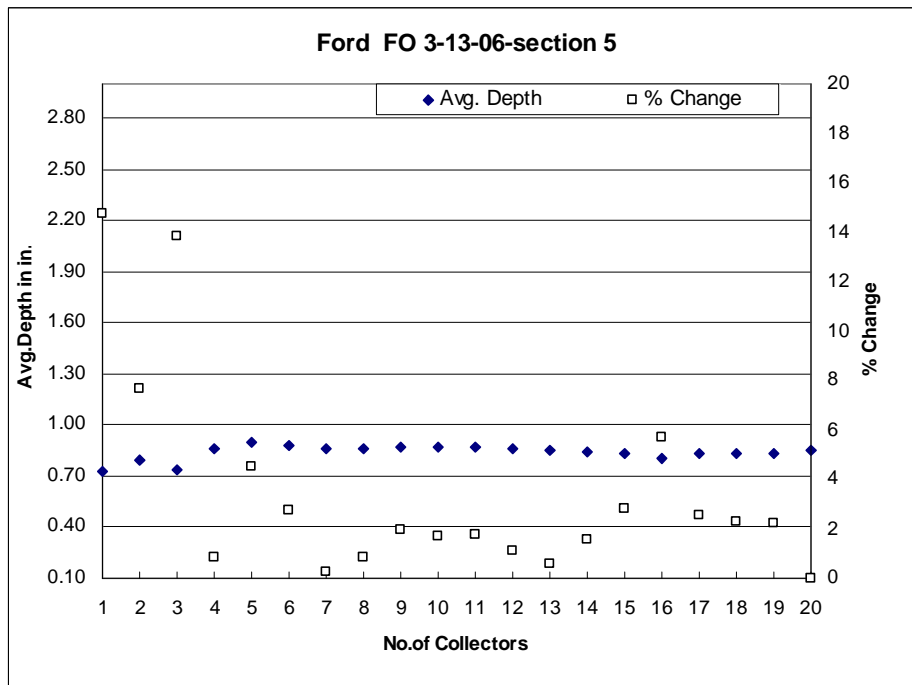
**Figure B.77.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-2 of the Ford FO 3-13-06 irrigation system data set.



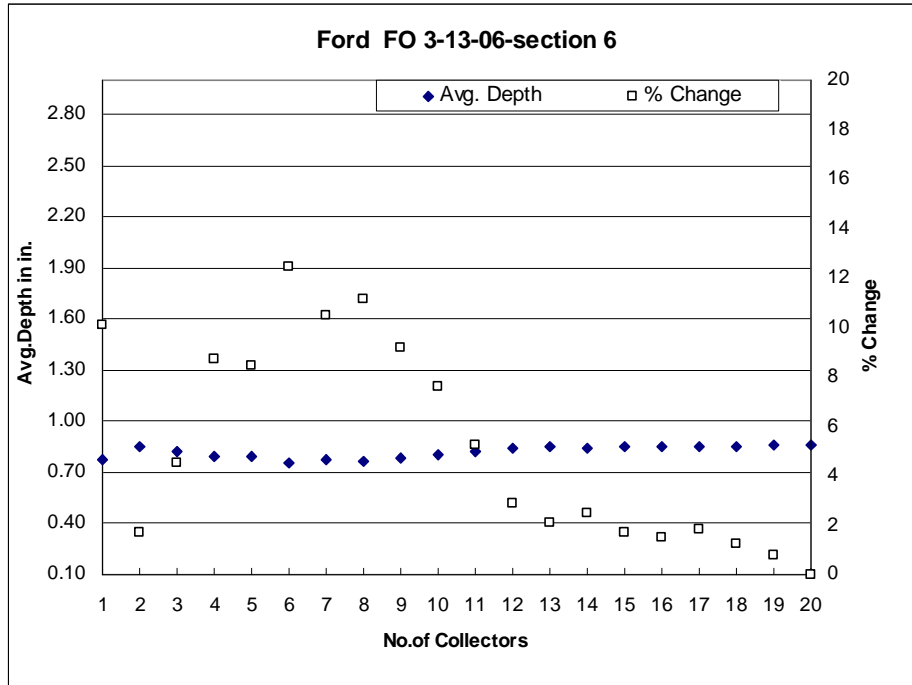
**Figure B.78.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-3 of the Ford FO 3-13-06 irrigation system data set.



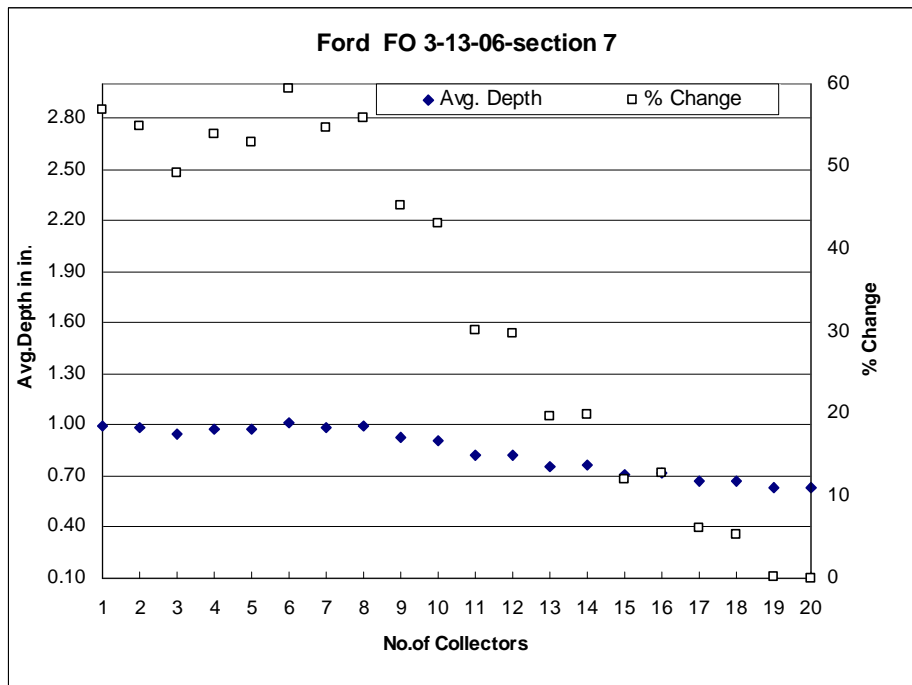
**Figure B.79.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-4 of the Ford FO 3-13-06 irrigation system data set.



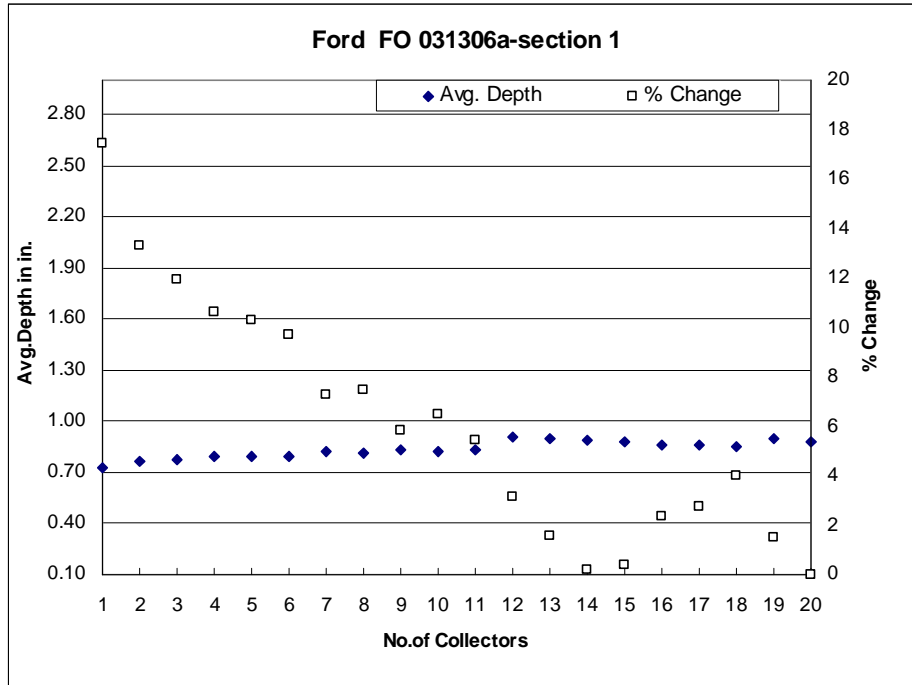
**Figure B.80.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-5 of the Ford FO 3-13-06 irrigation system data set.



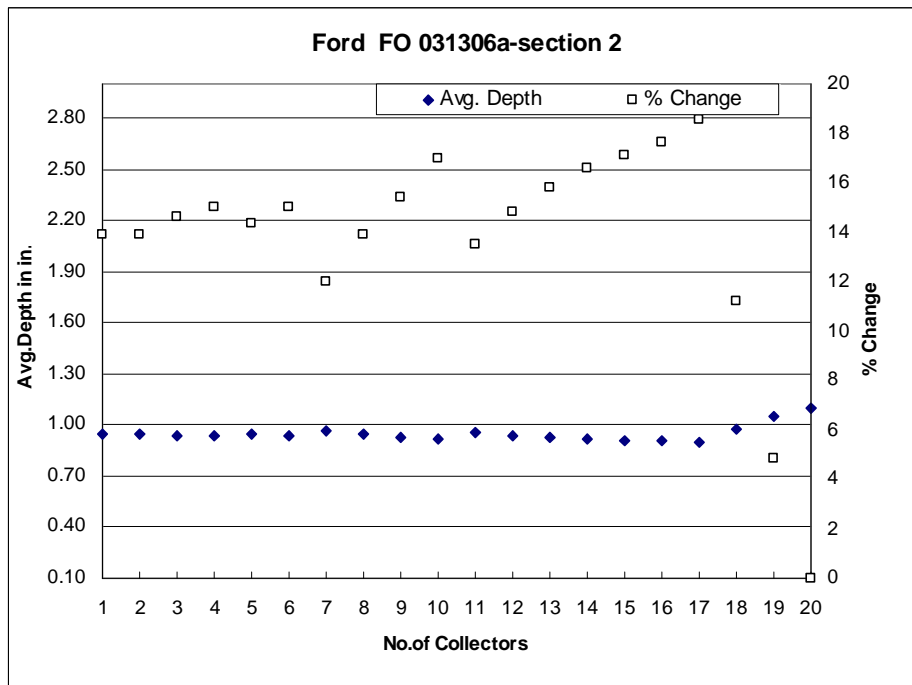
**Figure B.81.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-6 of the Ford FO 3-13-06 irrigation system data set.



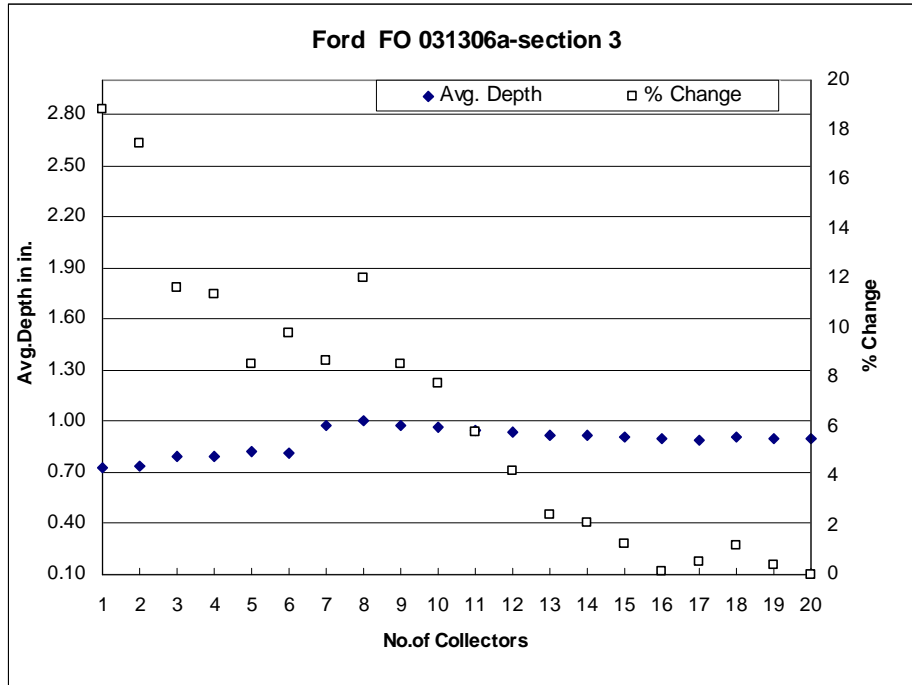
**Figure B.82.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-7 of the Ford FO 3-13-06 irrigation system data set.



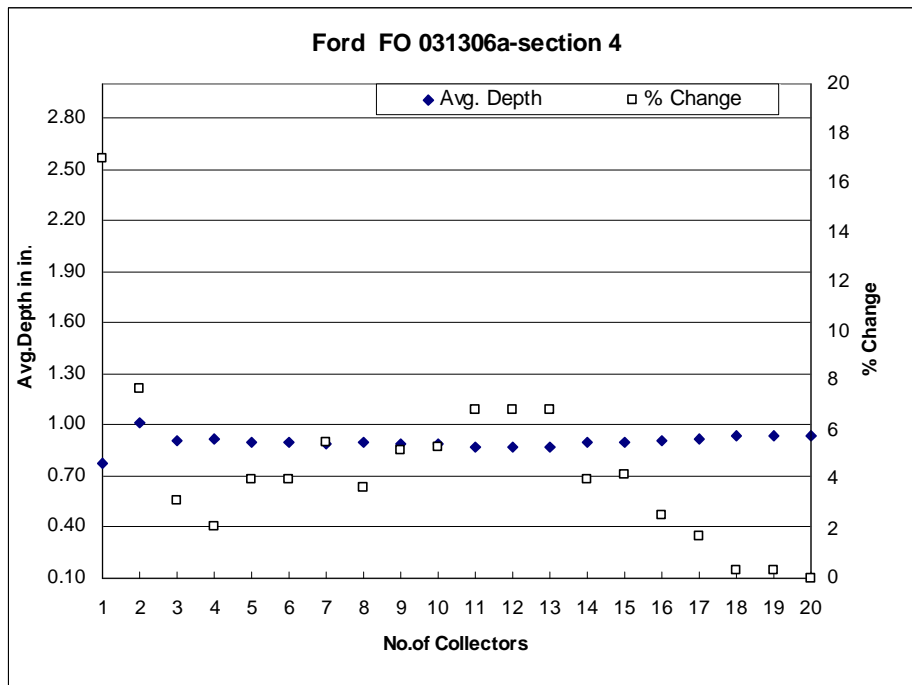
**Figure B.83.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-1 of the Ford FO 031306a irrigation system data set.



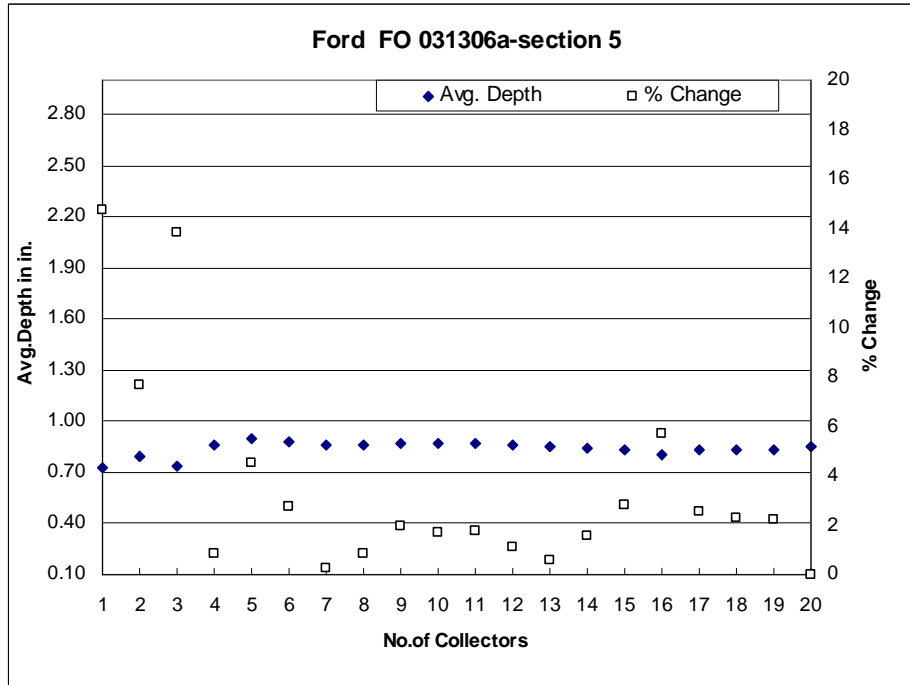
**Figure B.84.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-2 of the Ford FO 031306a irrigation system data set.



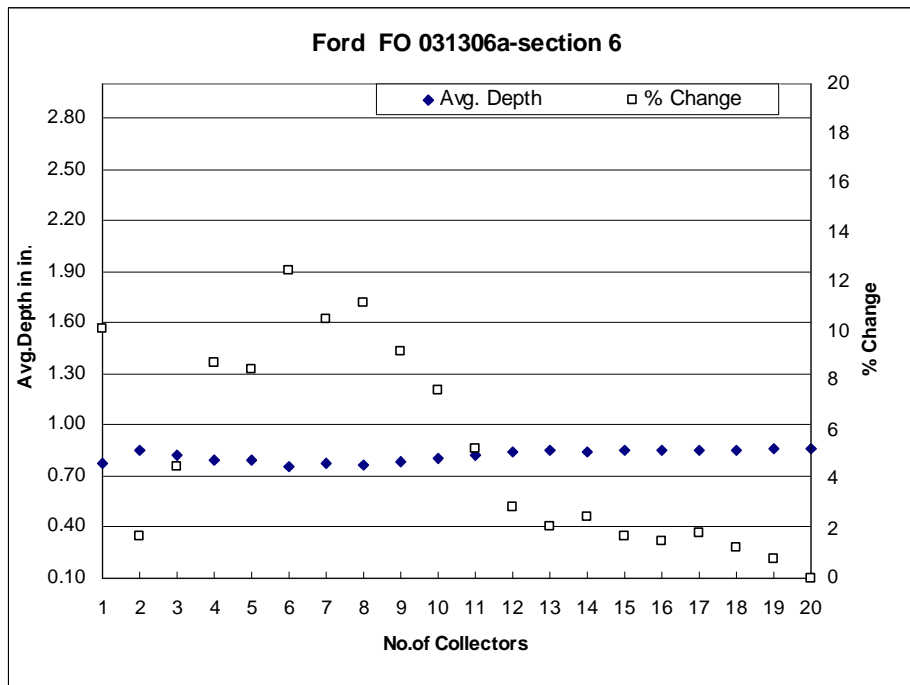
**Figure B.85.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-3 of the Ford FO 031306a irrigation system data set.



**Figure B.86.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-4 of the Ford FO 031306a irrigation system data set.

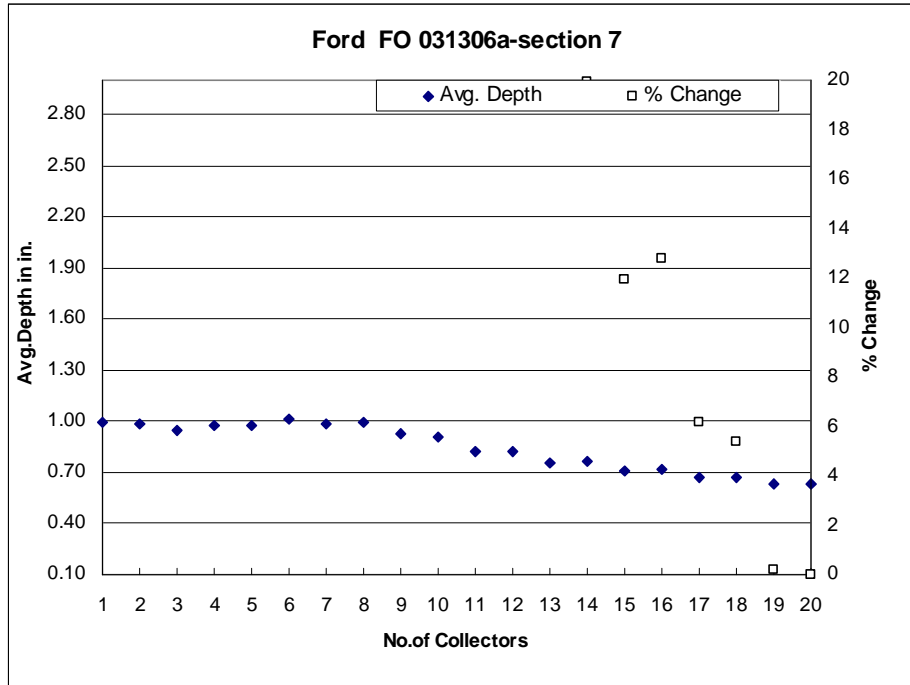


**Figure B.87.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-5 of the Ford FO 031306a irrigation system data set.

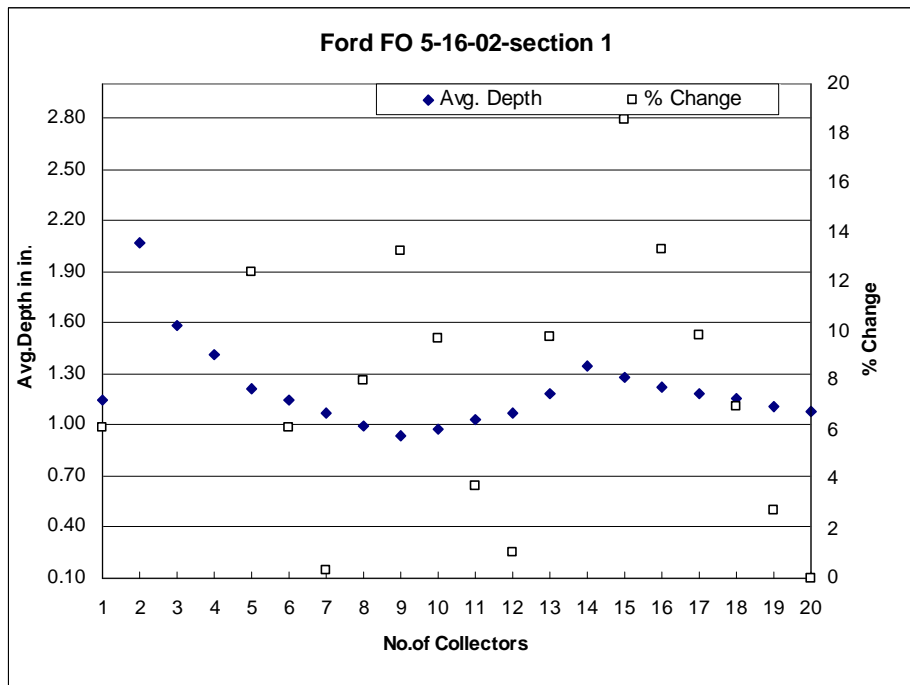


**Figure B.88.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-6 of the Ford FO 031306a irrigation system data set.

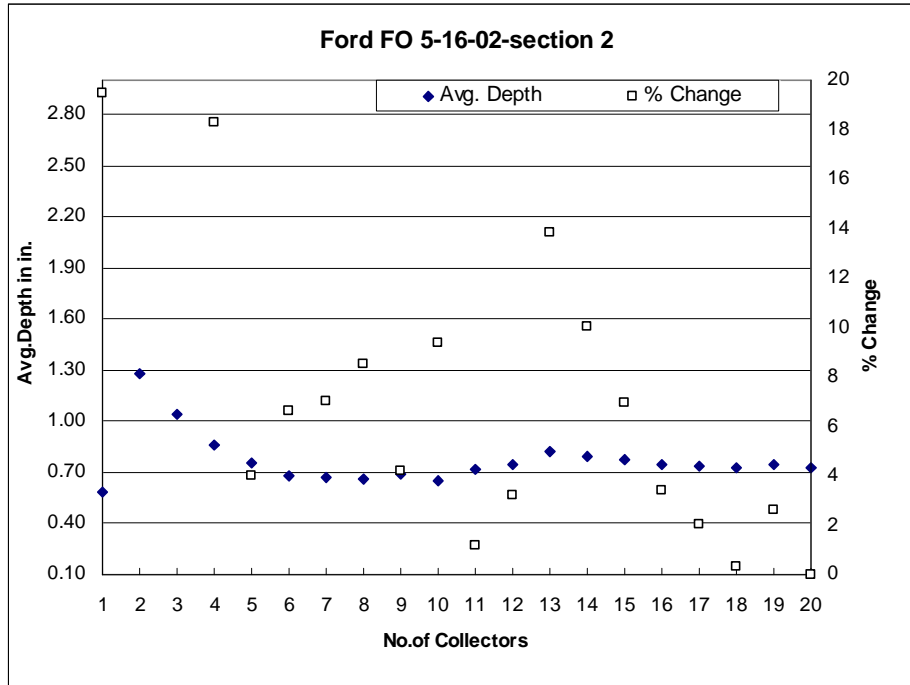




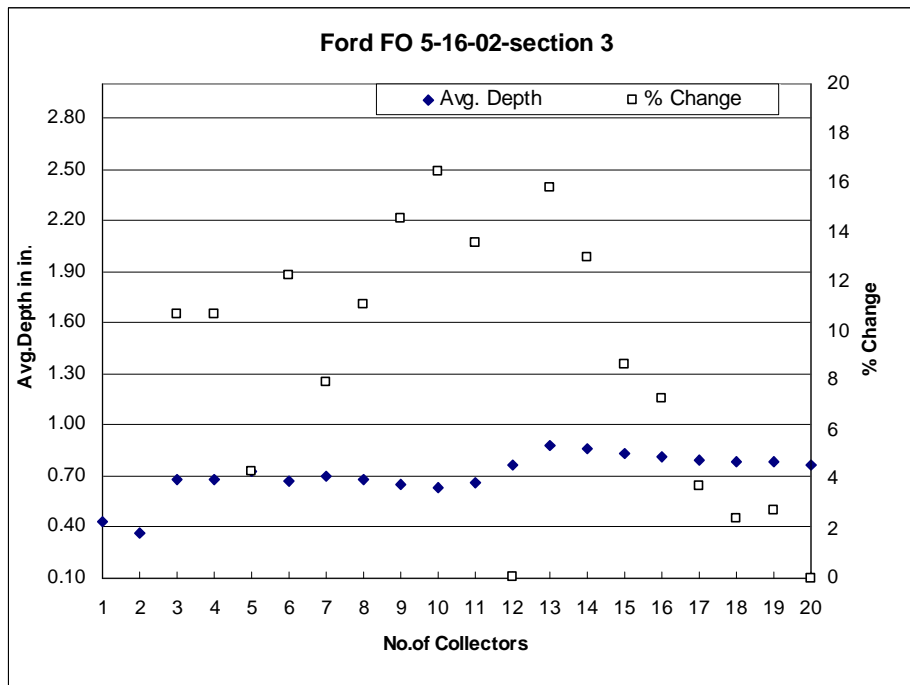
**Figure B.89.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-7 of the Ford FO 031306a irrigation system data set.



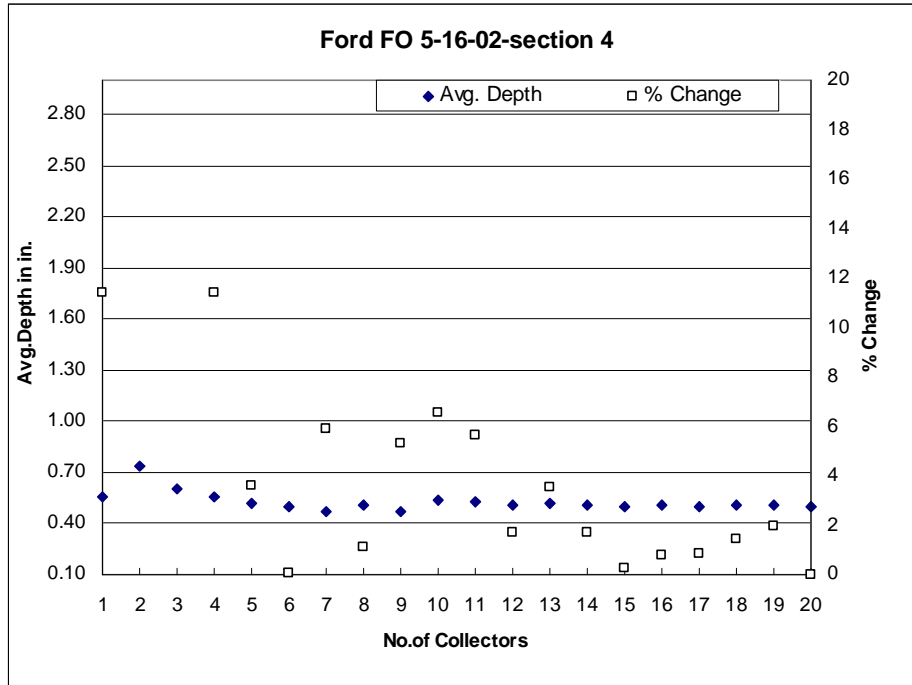
**Figure B.90.** The average depth and associated % change from the base average depth for collector subsets(19, 18, 17, ....1) from the base set of 20 collectors for section-1 of the Ford FO 5-16-02 irrigation system data set.



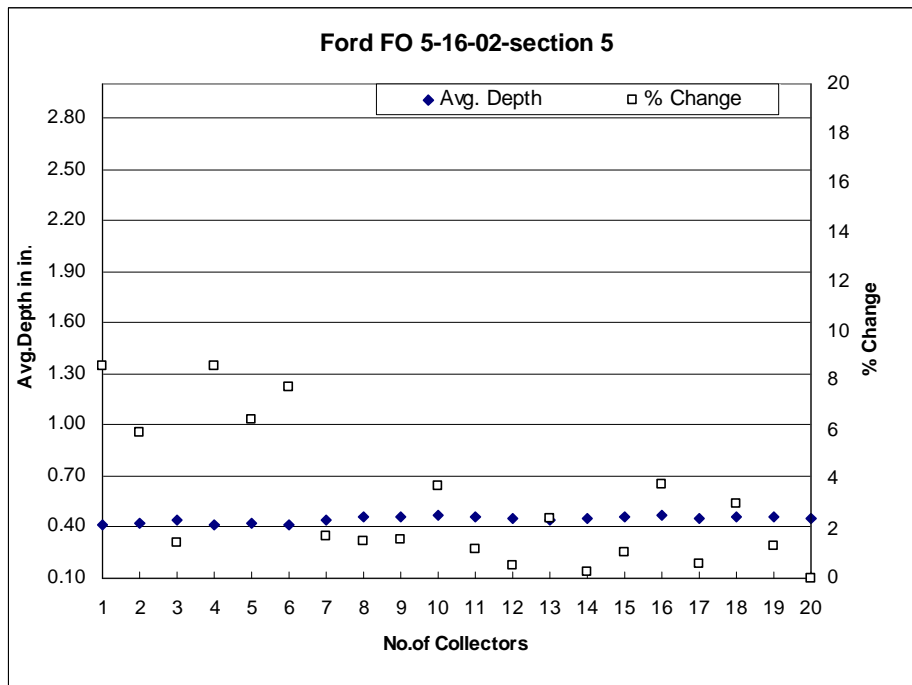
**Figure B.91.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-2 of the Ford FO 5-16-02 irrigation system data set.



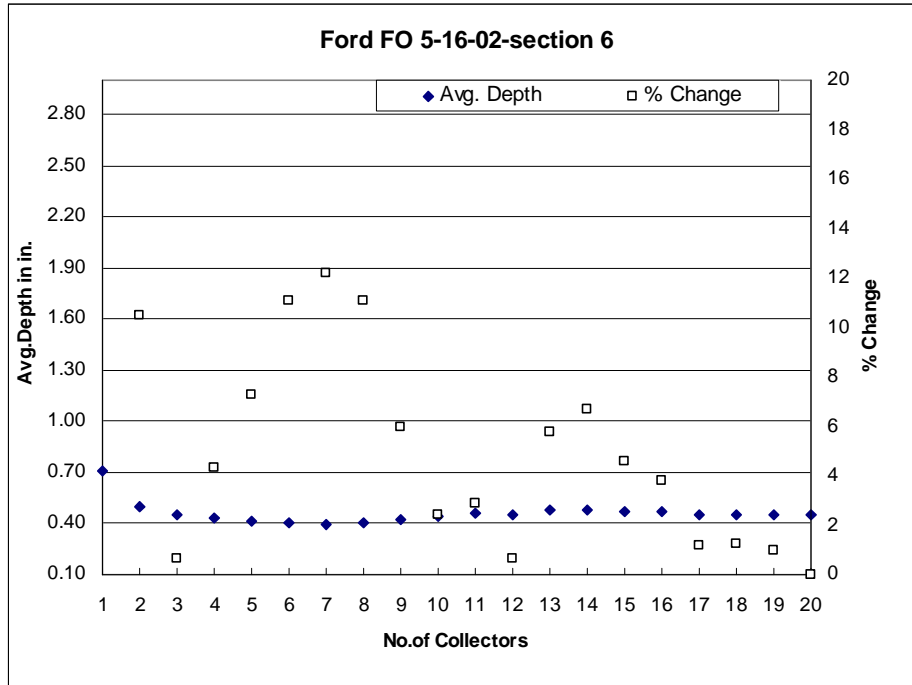
**Figure B.92.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-3 of the Ford FO 5-16-02 irrigation system data set.



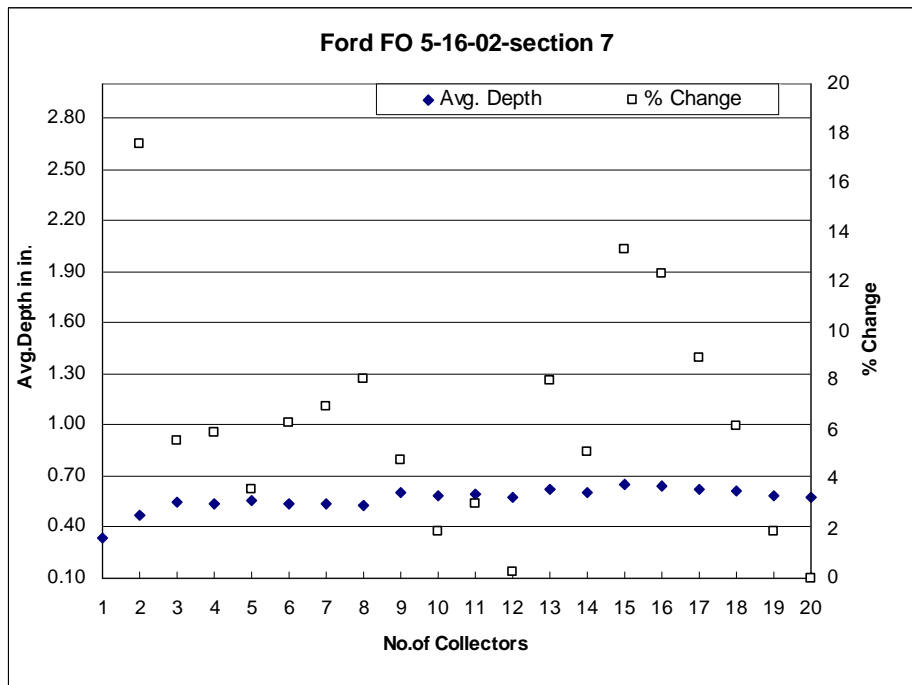
**Figure B.93.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-4 of the Ford FO 5-16-02 irrigation system data set.



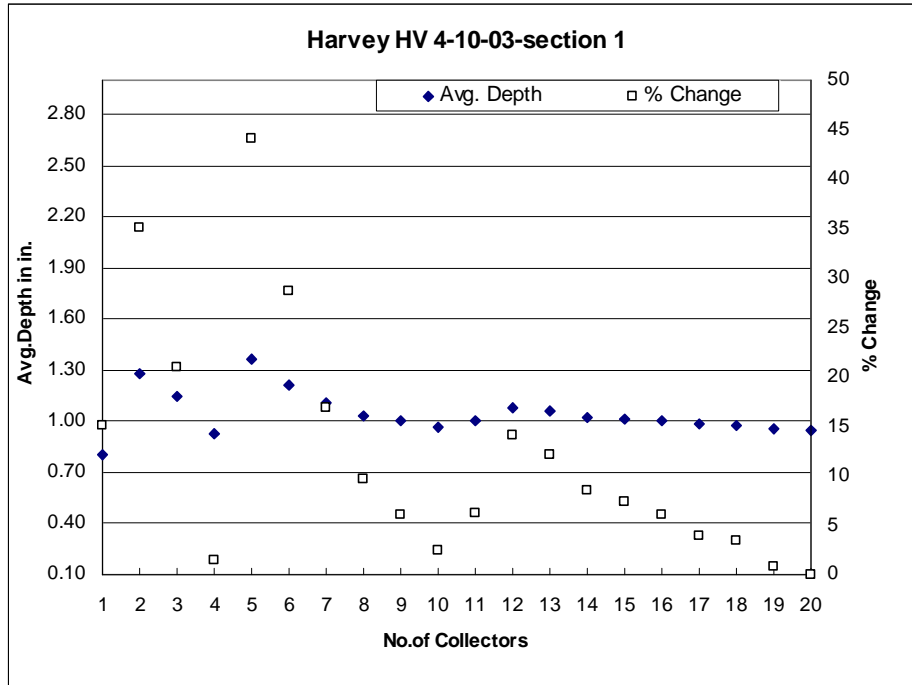
**Figure B.94.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-5 of the Ford FO 5-16-02 irrigation system data set.



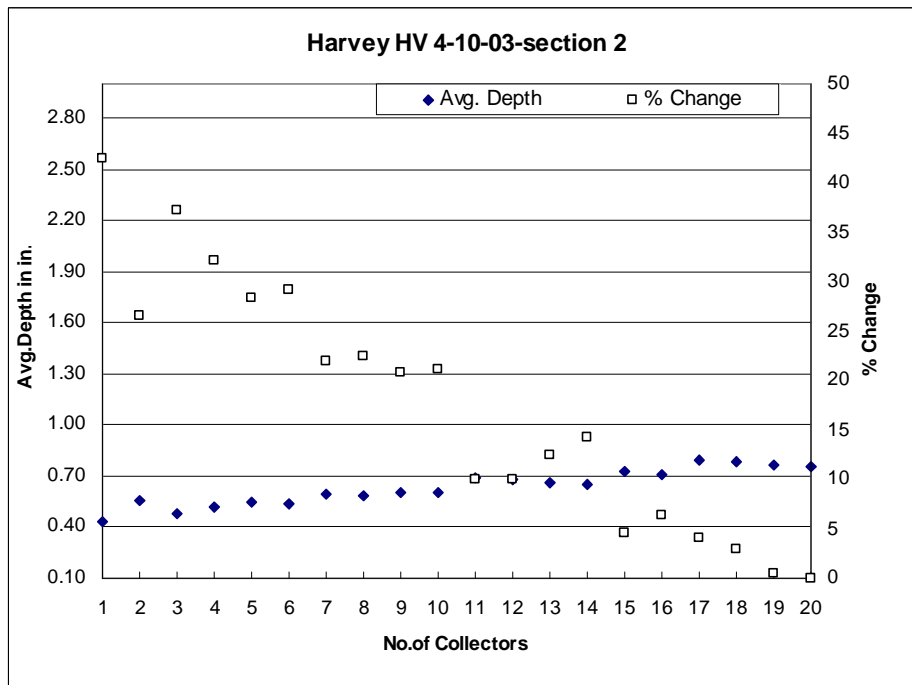
**Figure B.95.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-6 of the Ford FO 5-16-02 irrigation system data set.



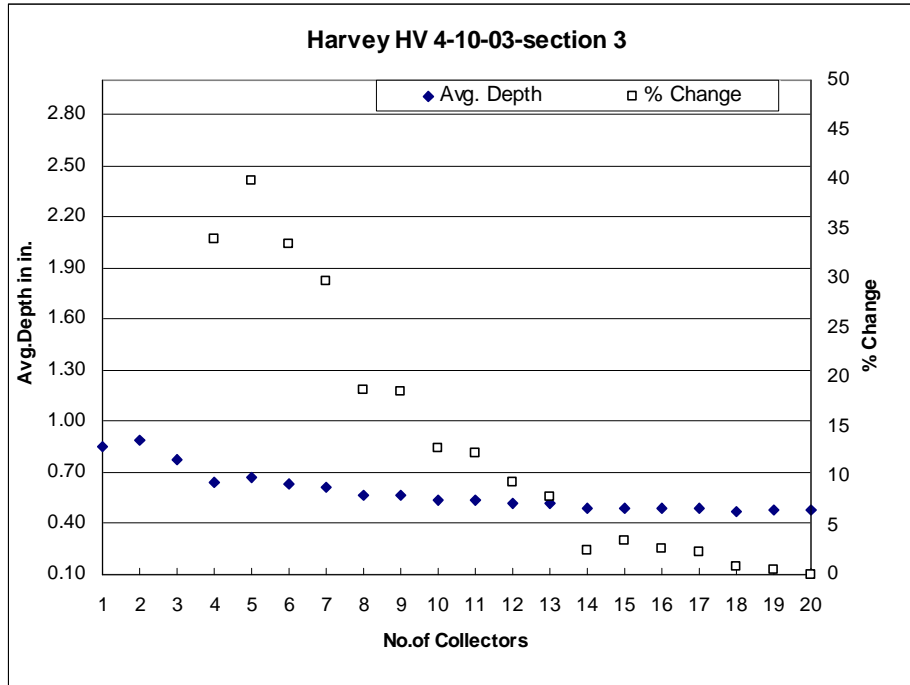
**Figure B.96.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-7 of the Ford FO 5-16-02 irrigation system data set.



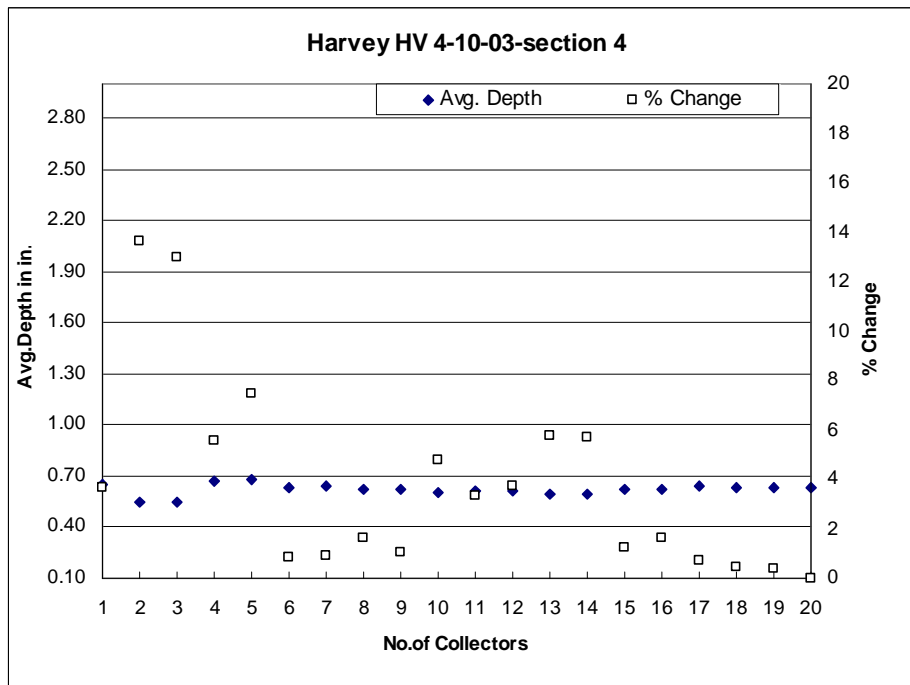
**Figure B.97.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-1 of the Harvey HV 4-10-03 irrigation system data set.



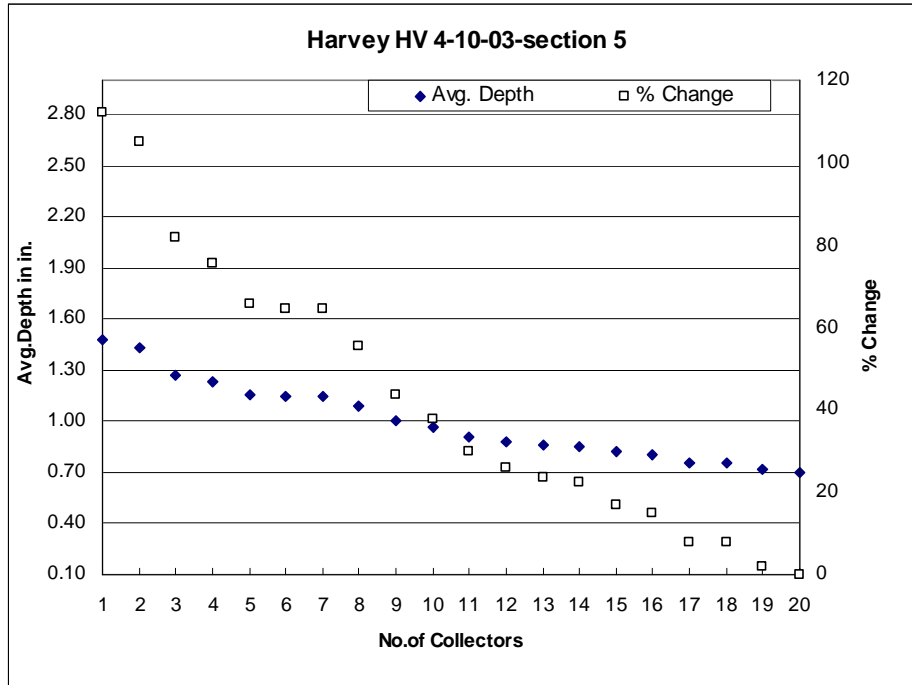
**Figure B.98.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-2 of the Harvey HV 4-10-03 irrigation system data set.



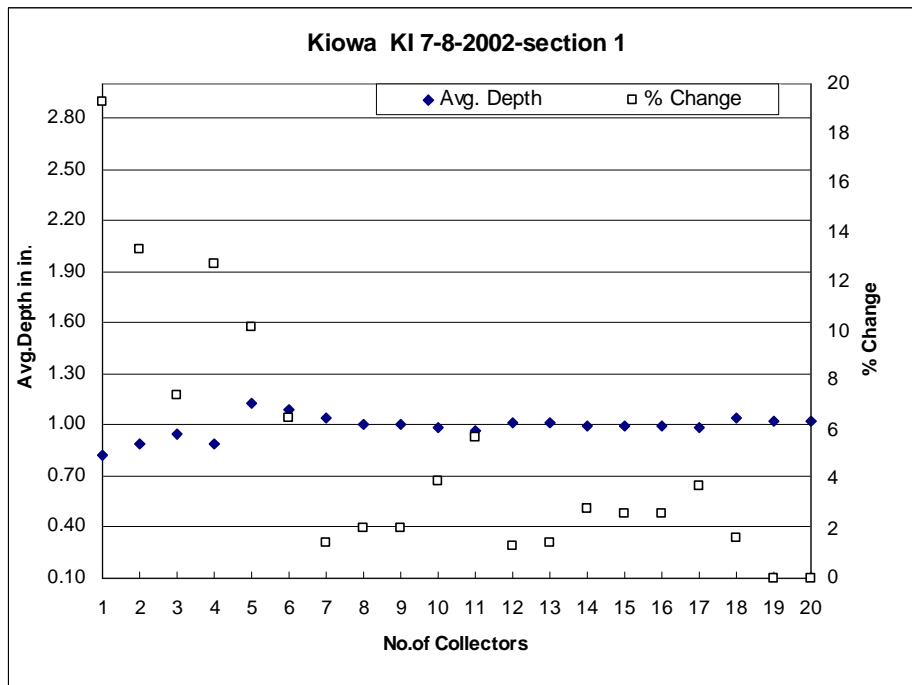
**Figure B.99.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-3 of the Harvey HV 4-10-03 irrigation system data set.



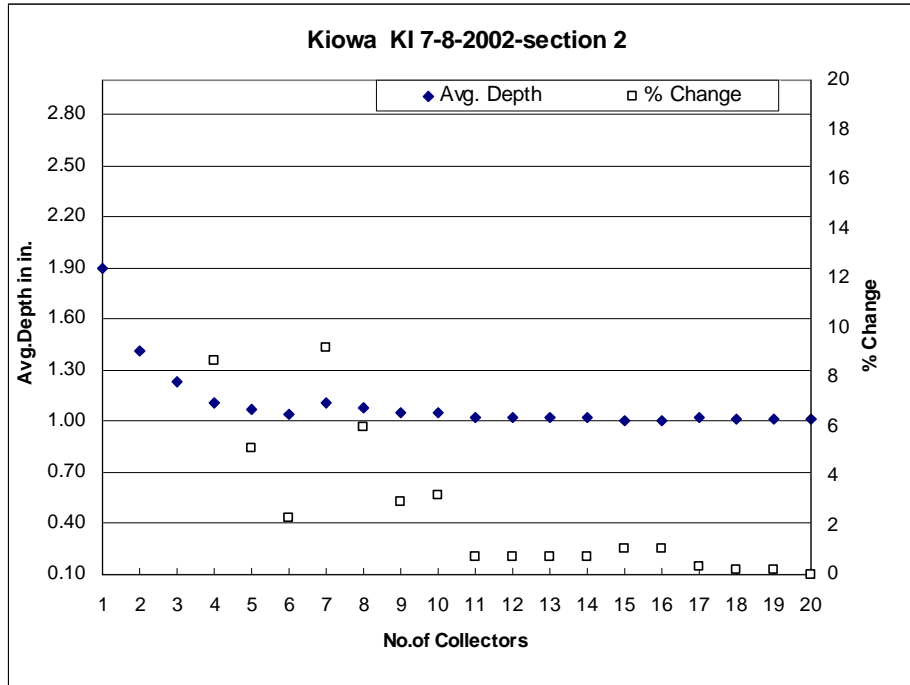
**Figure B.100.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-4 of the Harvey HV 4-10-03 irrigation system data set.



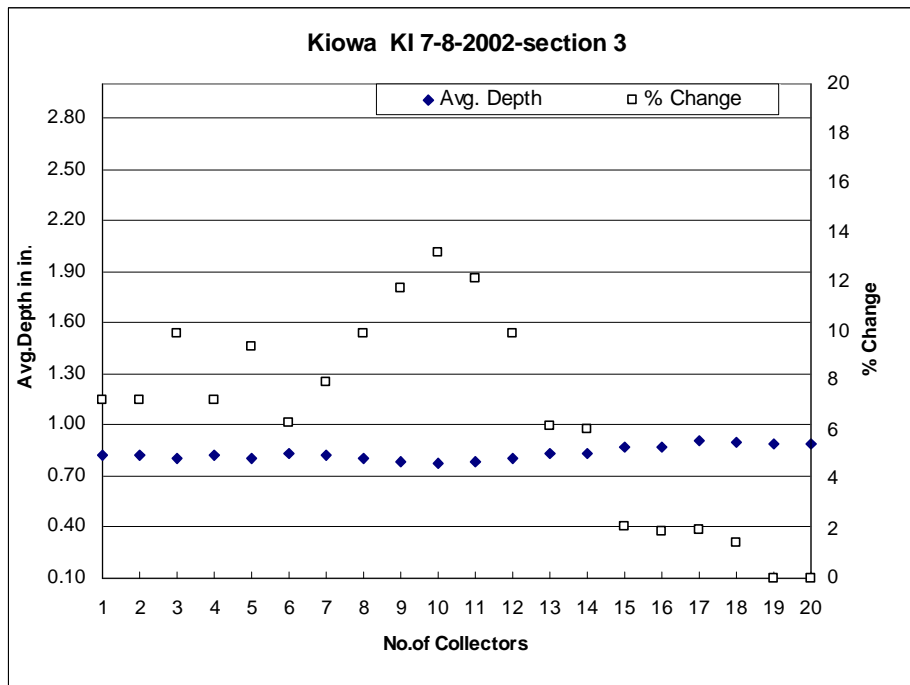
**Figure B.101.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-5 of the Harvey HV 4-10-03 irrigation system data set.



**Figure B.102.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-1 of the Kiowa KI 7-8-2002 irrigation system data set.

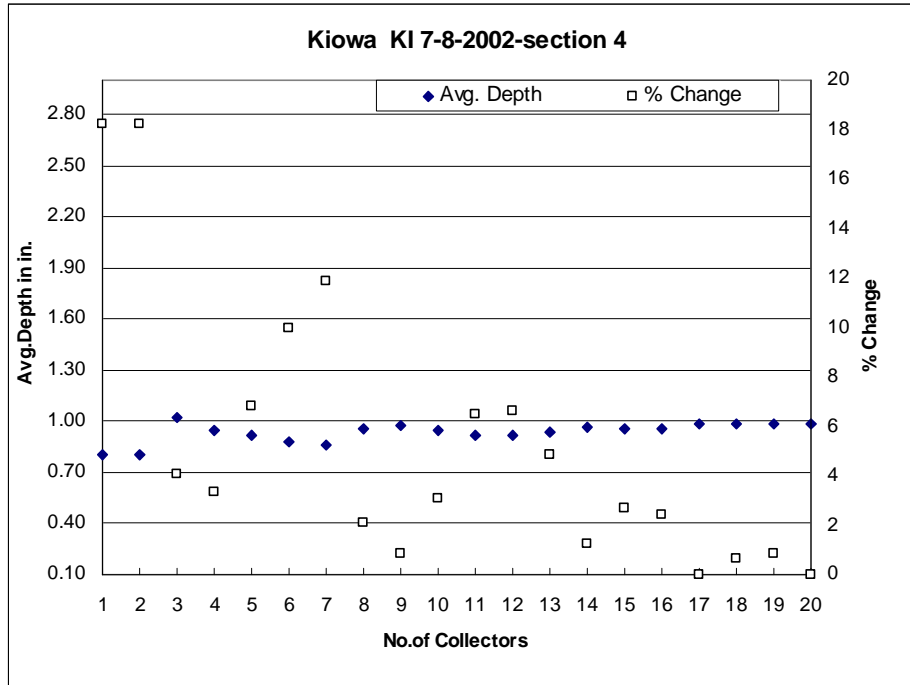


**Figure B.103.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-2 of the Kiowa KI 7-8-2002 irrigation system data set.

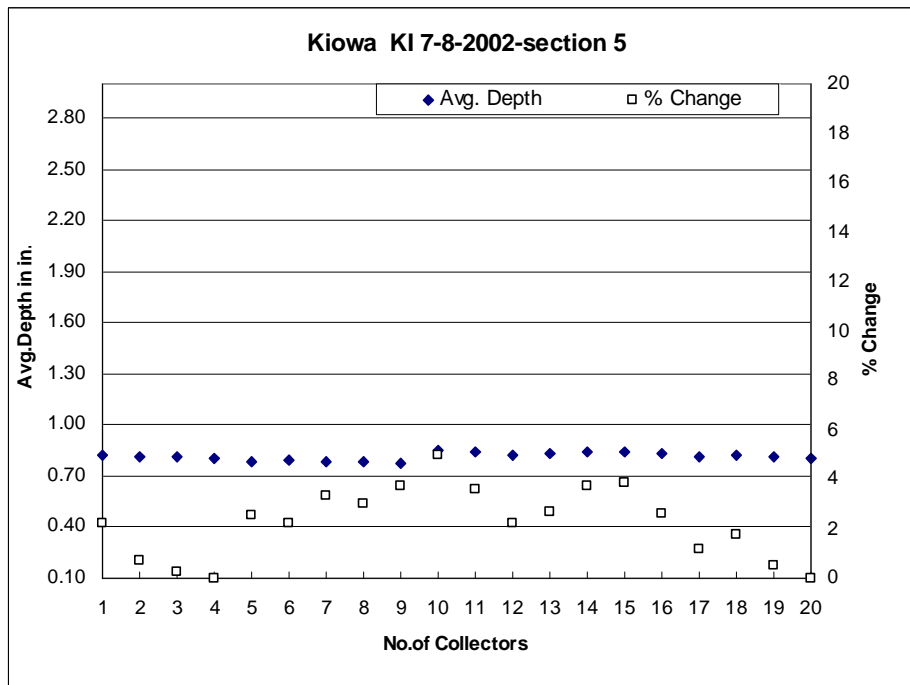


**Figure B.104.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-3 of the Kiowa KI 7-8-2002 irrigation system data set.

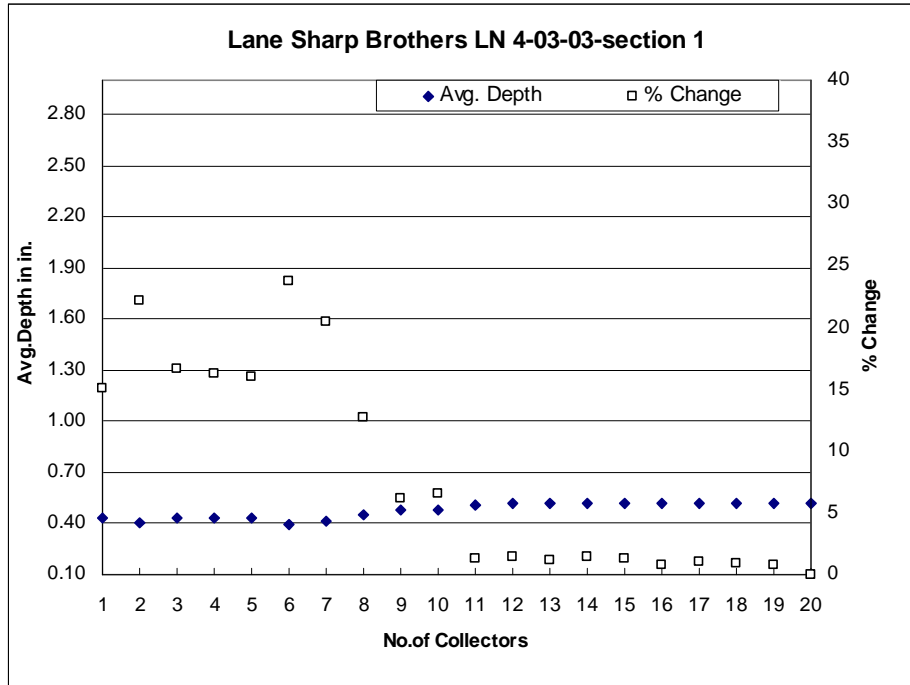




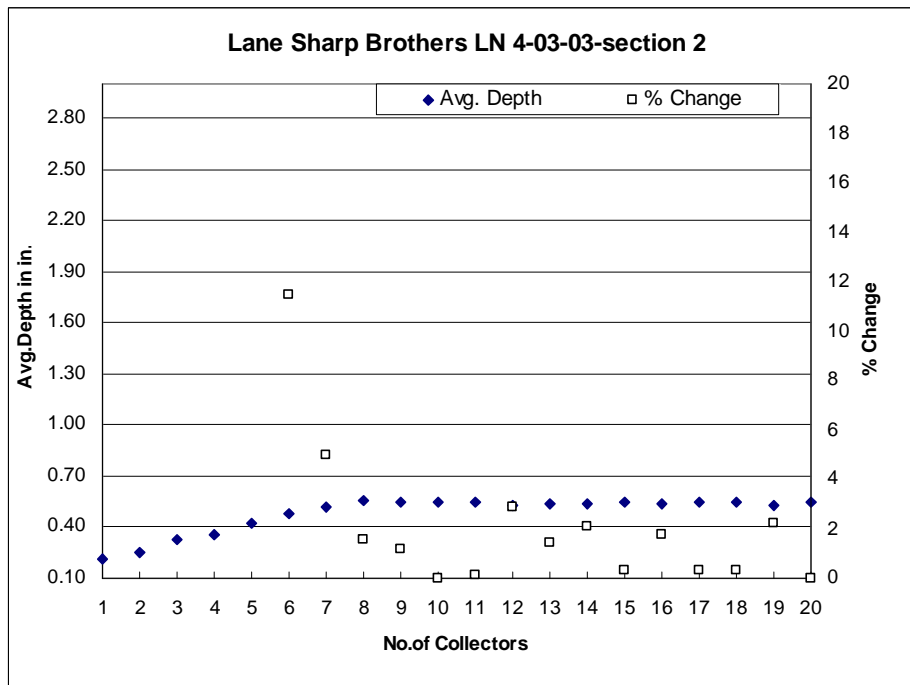
**Figure B.105.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-4 of the Kiowa KI 7-8-2002 irrigation system data set.



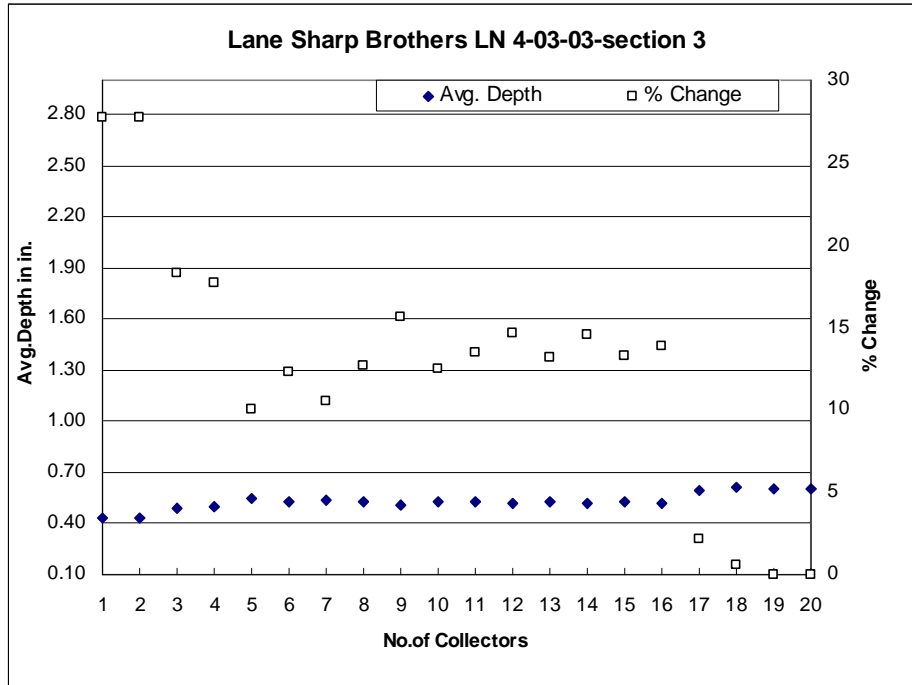
**Figure B.106.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-5 of the Kiowa KI 7-8-2002 irrigation system data set.



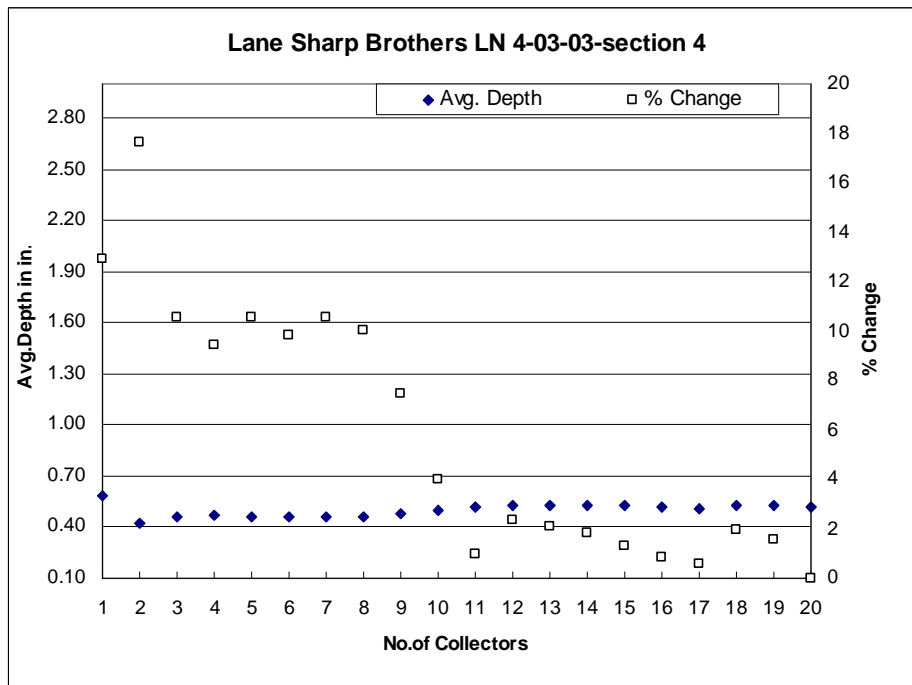
**Figure B.107.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-1 of the Lane Sharp Brothers LN 4-03-03 irrigation system data set.



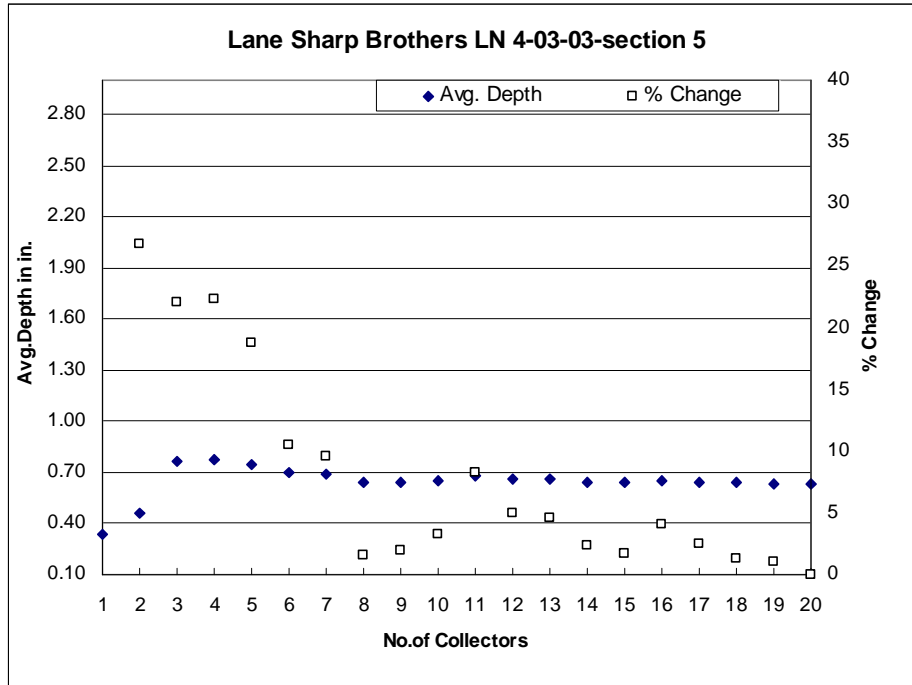
**Figure B.108.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-2 of the Lane Sharp Brothers LN 4-03-03 irrigation system data set.



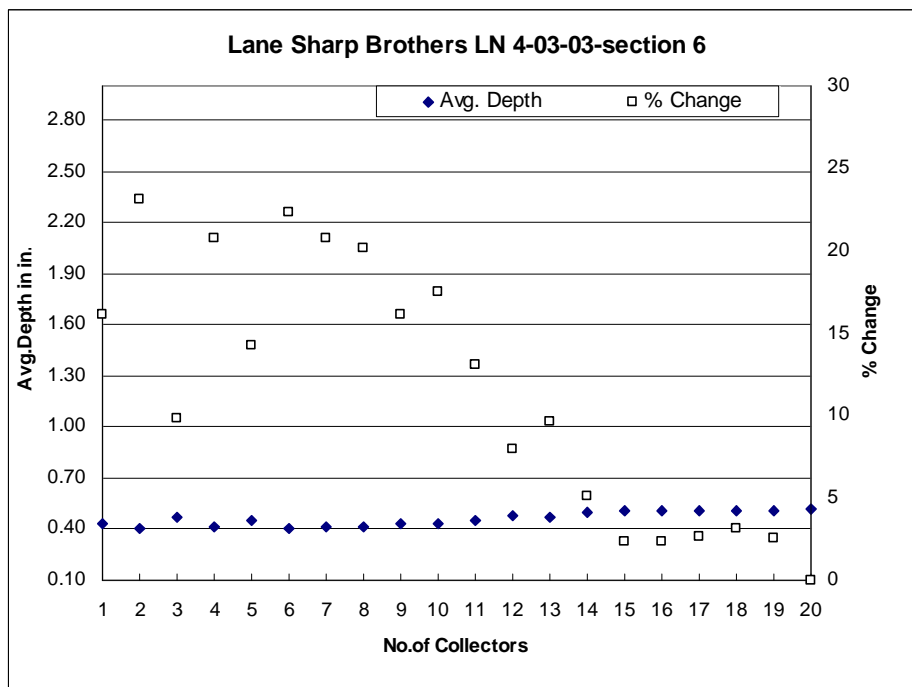
**Figure B.109.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-3 of the Lane Sharp Brothers LN 4-03-03 irrigation system data set.



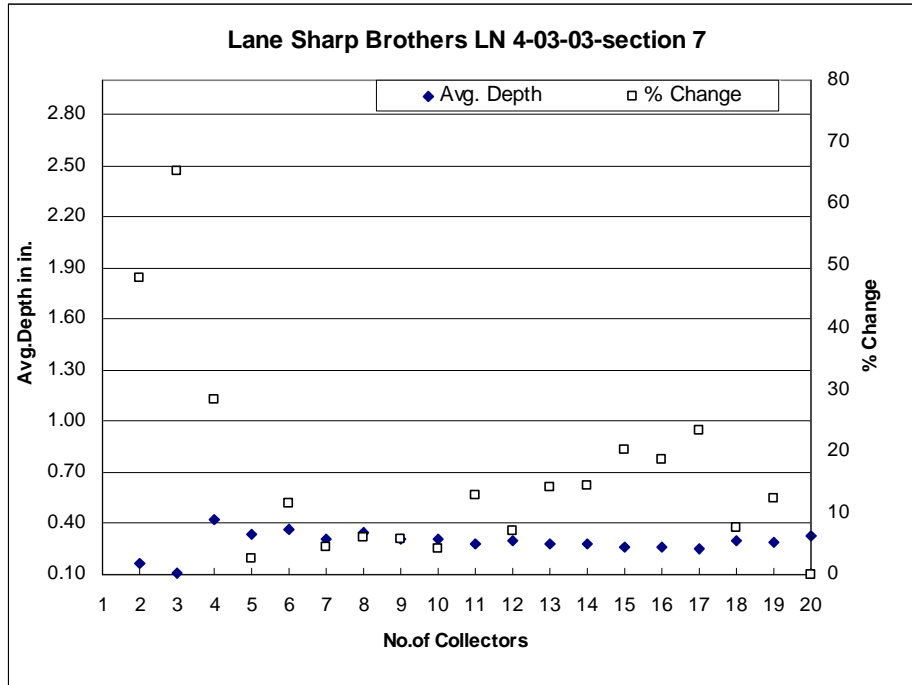
**Figure B.110.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-4 of the Lane Sharp Brothers LN 4-03-03 irrigation system data set.



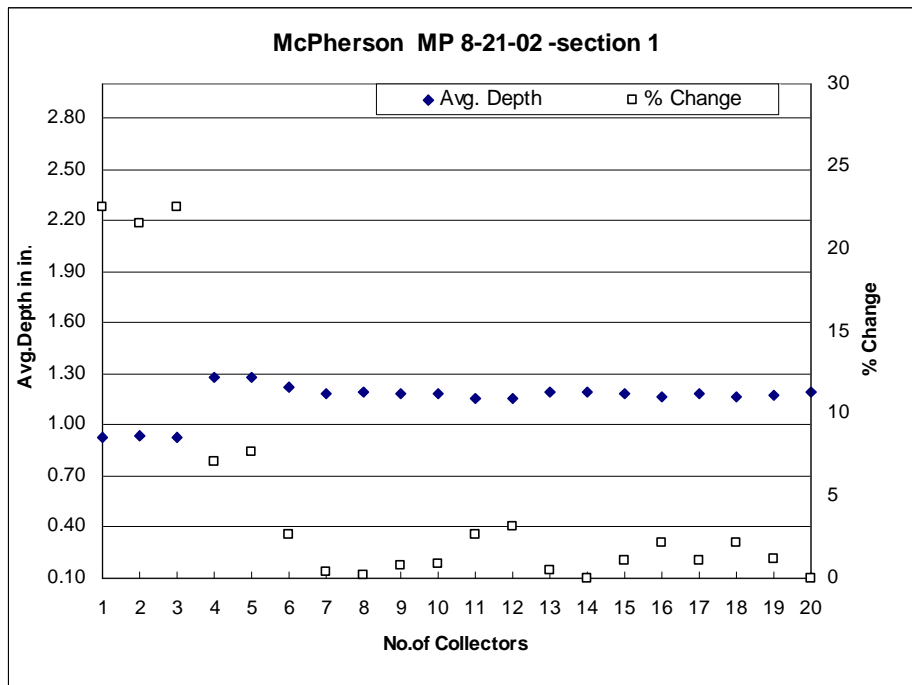
**Figure B.111.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-5of the Lane Sharp Brothers LN 4-03-03 irrigation system data set.



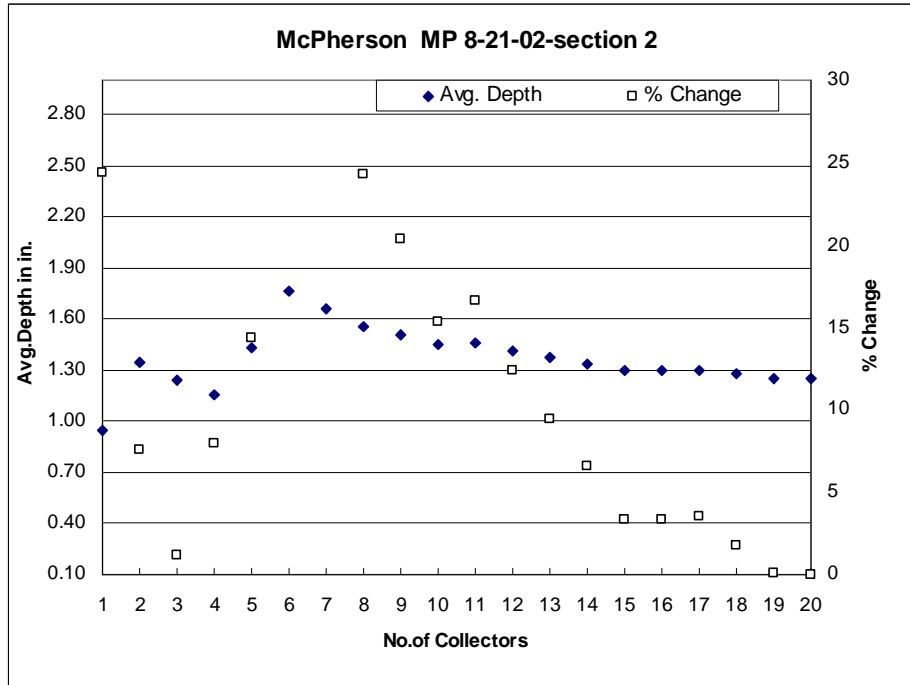
**Figure B.112.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-6 of the Lane Sharp Brothers LN 4-03-03 irrigation system data set.



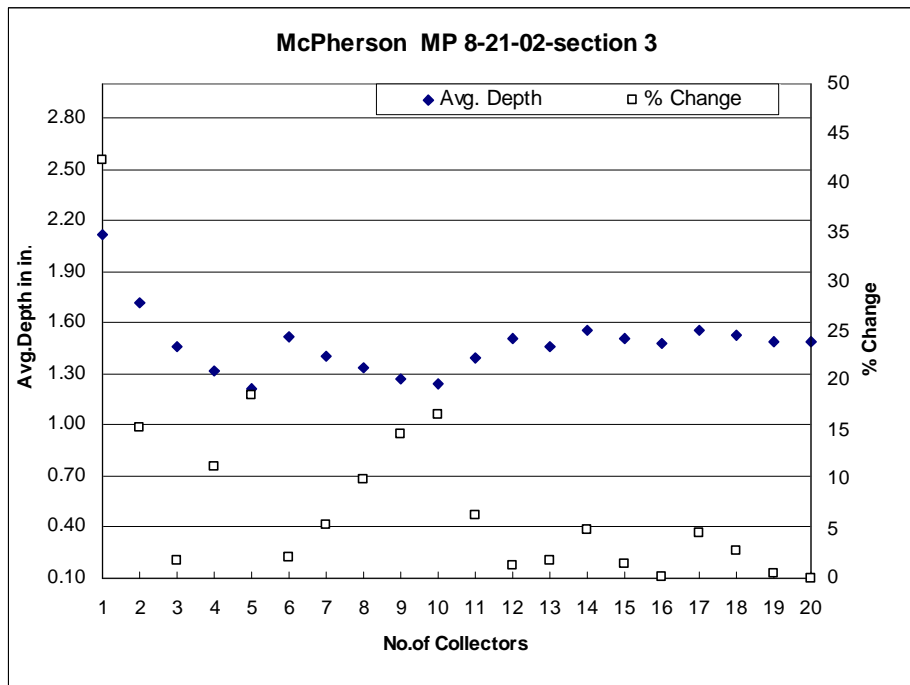
**Figure B.113.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-7 of the Lane Sharp Brothers LN 4-03-03 irrigation system data set.



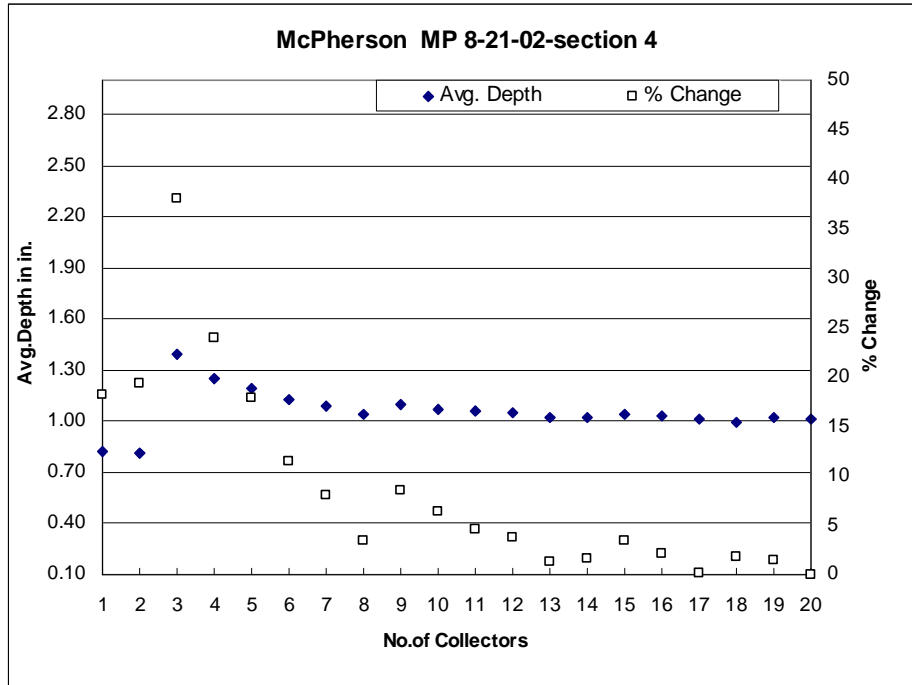
**Figure B.114.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-1 of the McPherson MP 8-21-02 irrigation system data set.



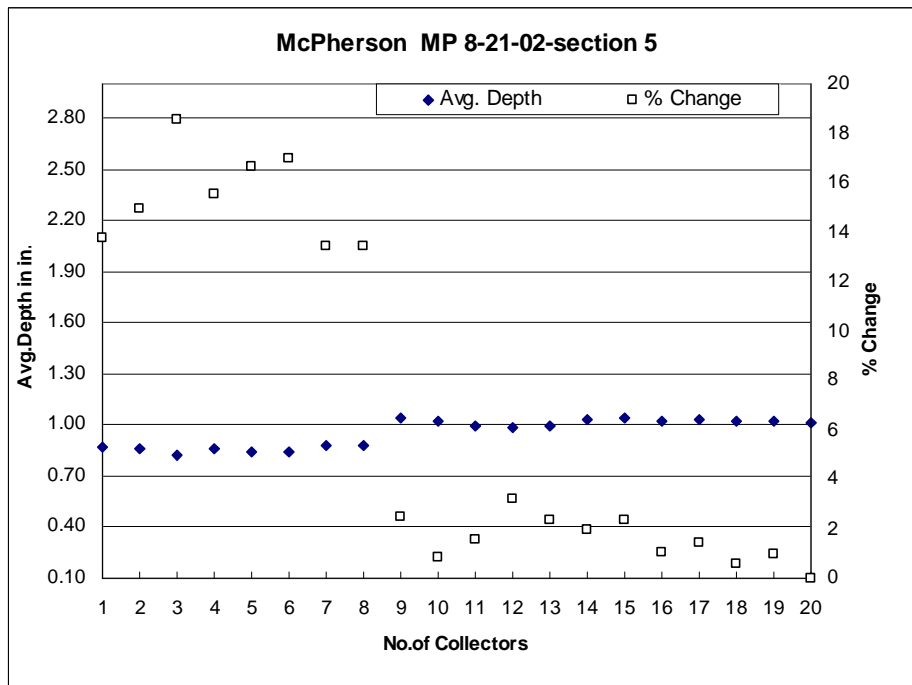
**Figure B.115.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-2 of the McPherson MP 8-21-02 irrigation system data set.



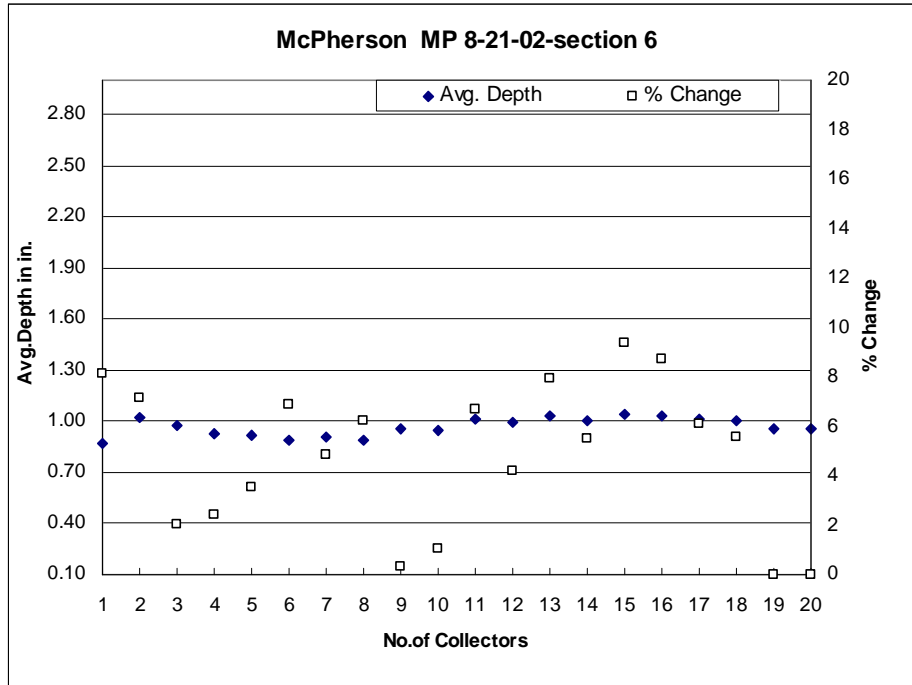
**Figure B.116.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-3 of the McPherson MP 8-21-02 irrigation system data set.



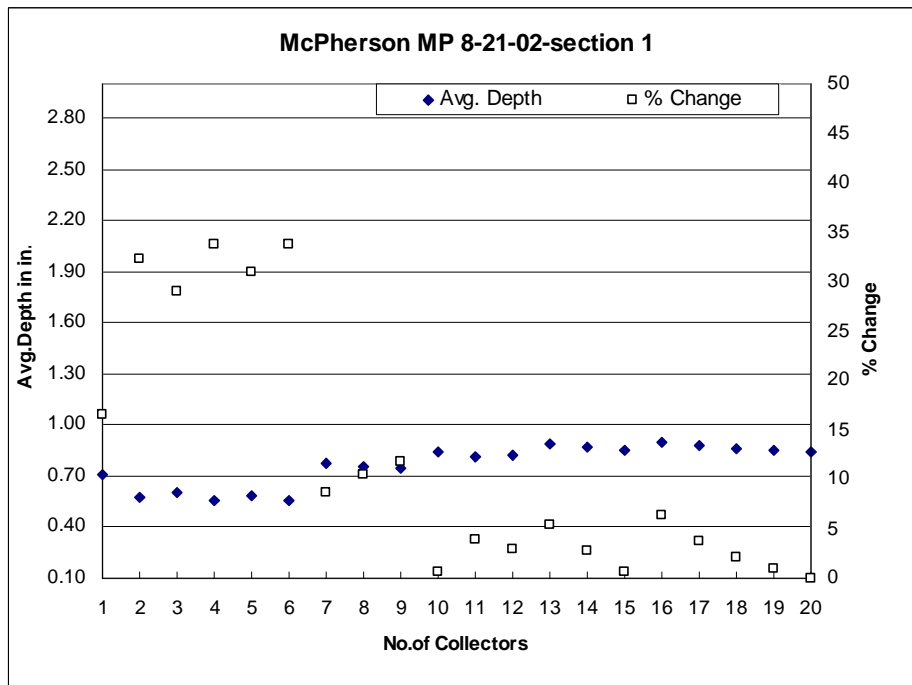
**Figure B.117.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-4 of the McPherson MP 8-21-02 irrigation system data set.



**Figure B.118.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-5 of the McPherson MP 8-21-02 irrigation system data set.

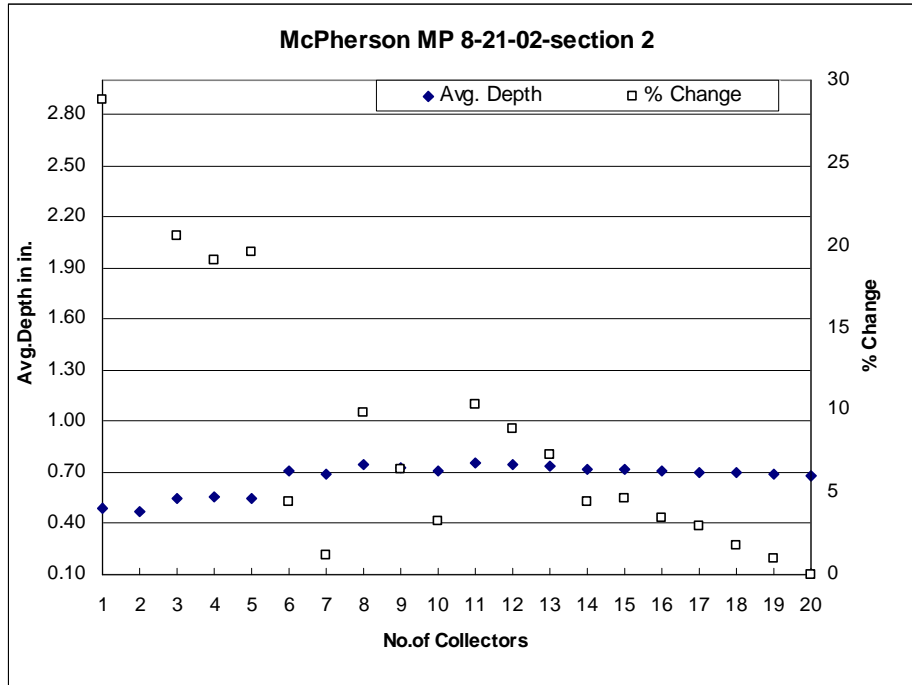


**Figure B.119.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-6 of the McPherson MP 8-21-02 irrigation system data set.

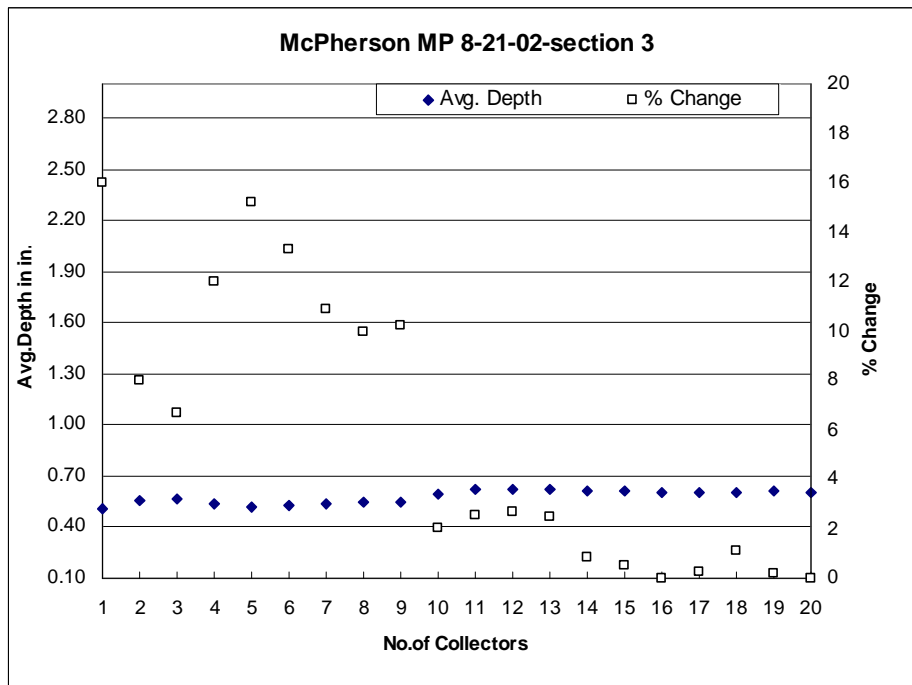


**Figure B.120.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-1 of the McPherson MP 8-21-02 irrigation system data set.

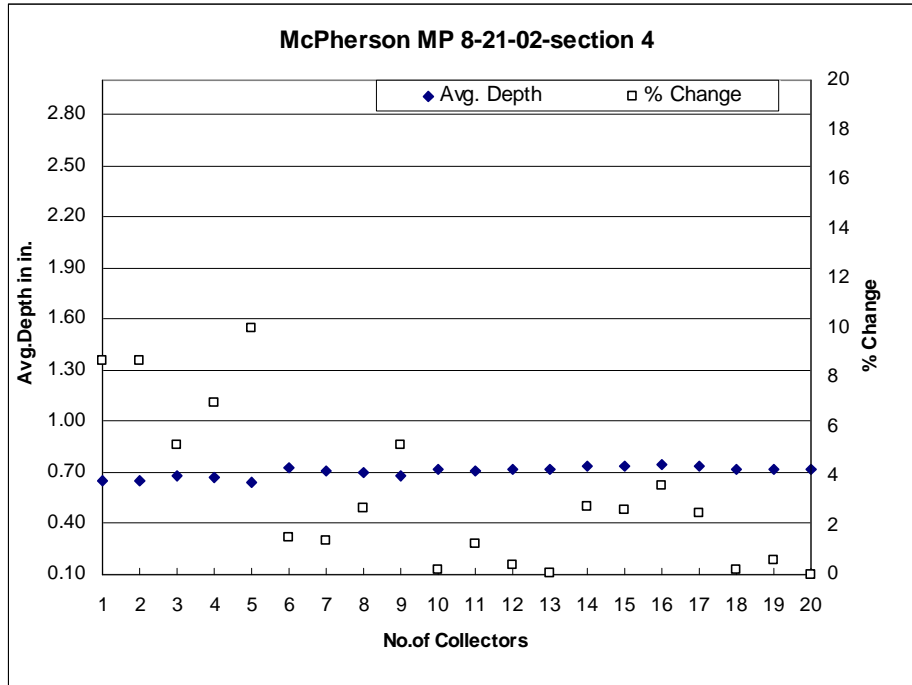




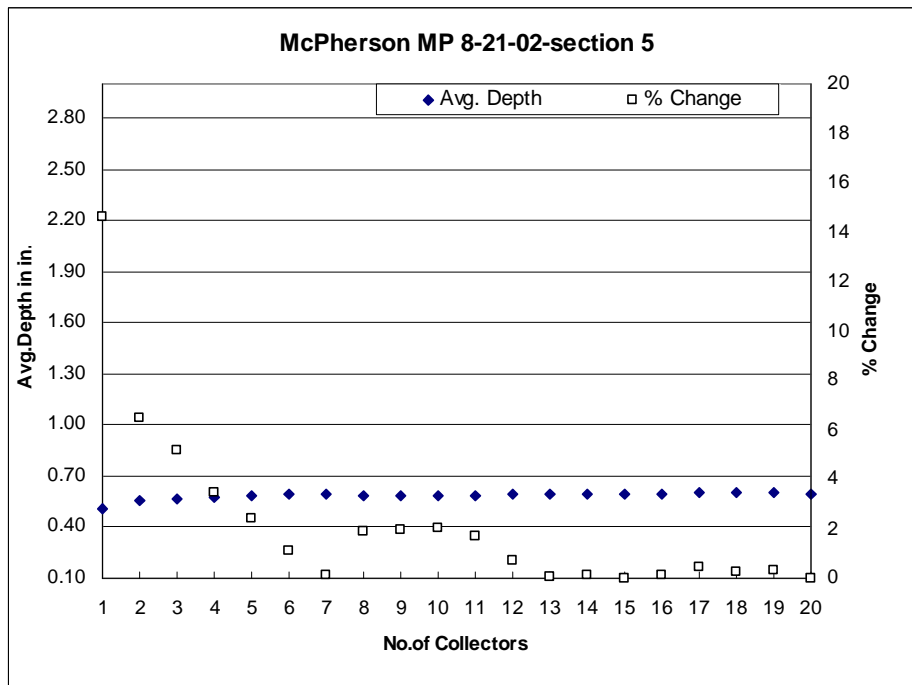
**Figure121.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-2 of the McPherson MP 8-21-02 irrigation system data set.



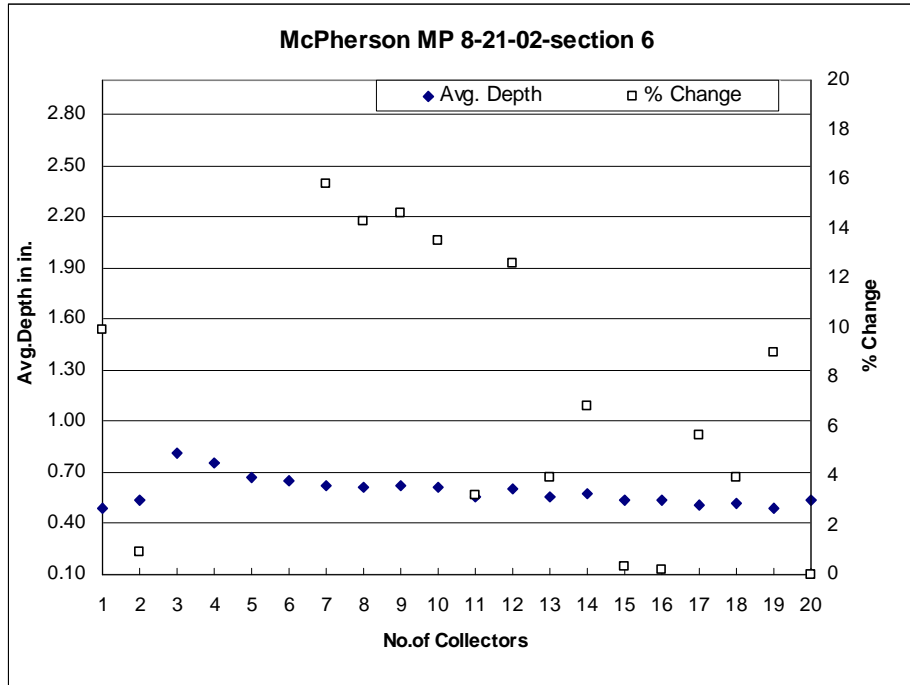
**Figure B.122.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-3 of the McPherson MP 8-21-02 irrigation system data set.



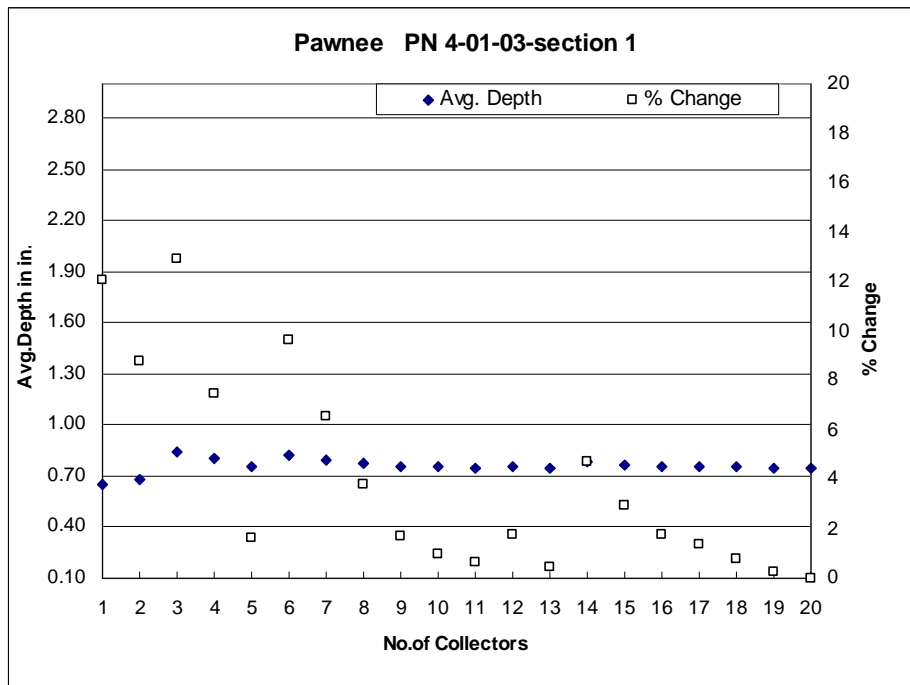
**Figure B.123.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-4 of the McPherson MP 8-21-02 irrigation system data set.



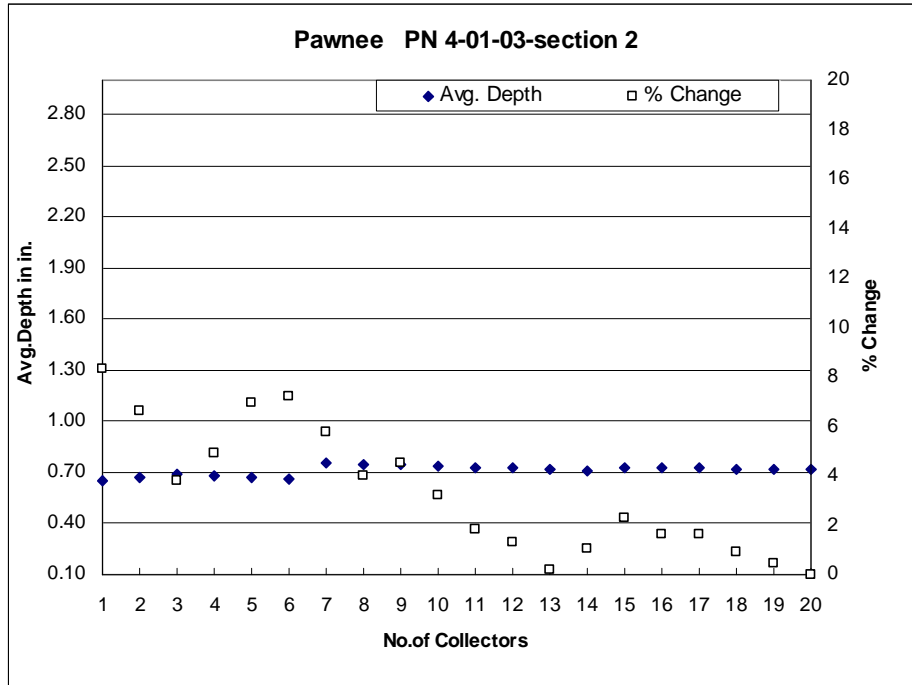
**Figure B.124.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-5 of the McPherson MP 8-21-02 irrigation system data set.



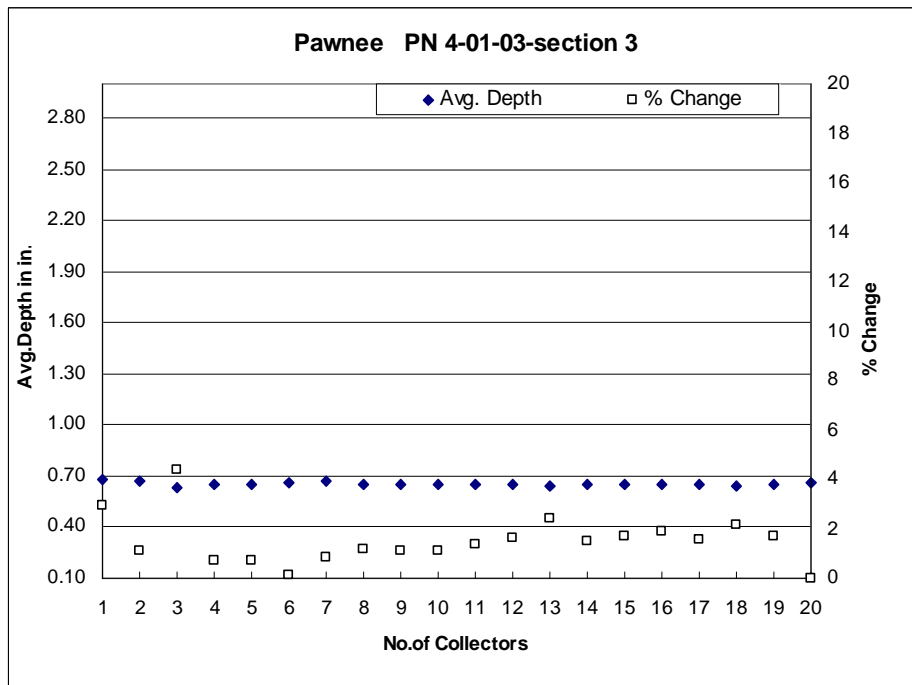
**Figure B.125.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-6 of the McPherson MP 8-21-02 irrigation system data set.



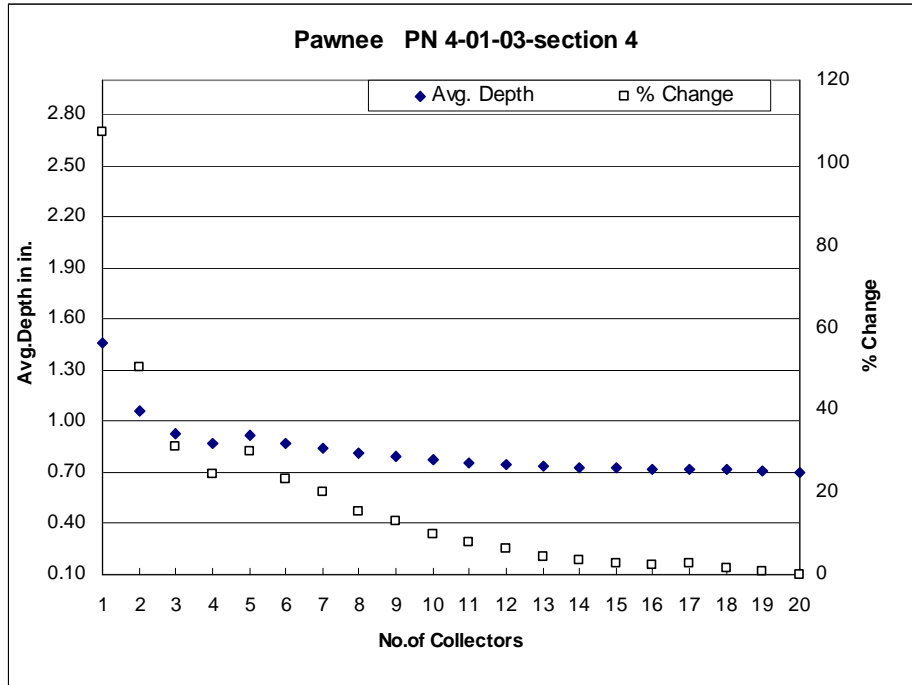
**Figure B.126.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-1 of the Pawnee PN 4-01-03 irrigation system data set.



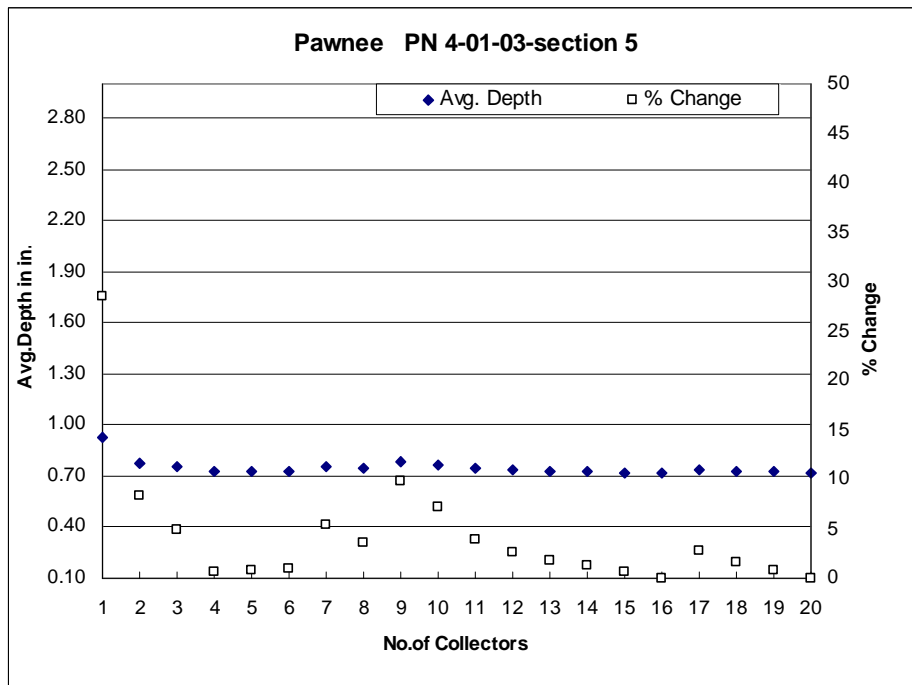
**Figure B.127.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-2 of the Pawnee PN 4-01-03 irrigation system data set.



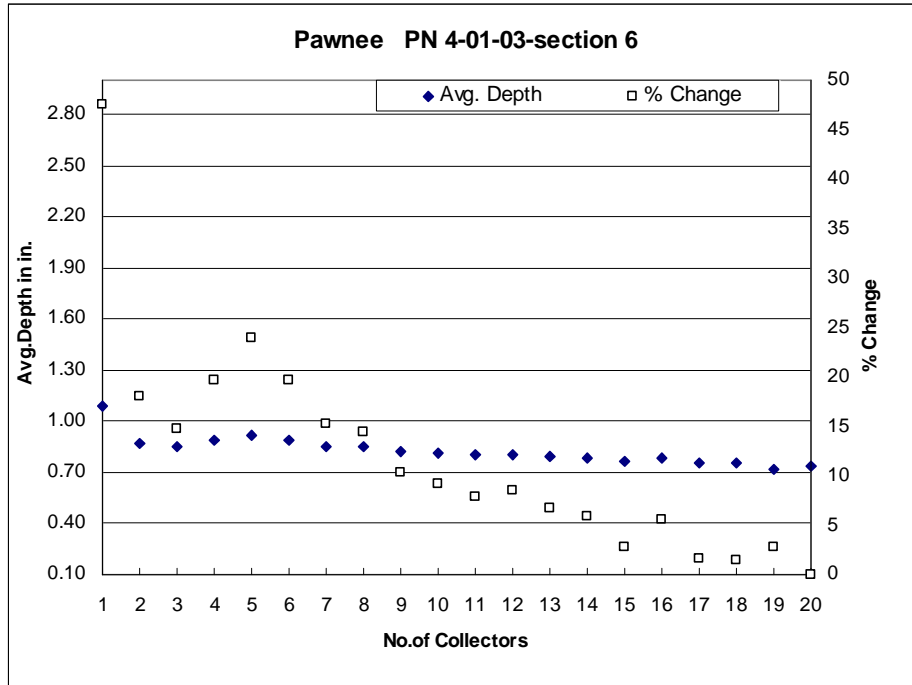
**Figure B.128.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-3 of the Pawnee PN 4-01-03 irrigation system data set.



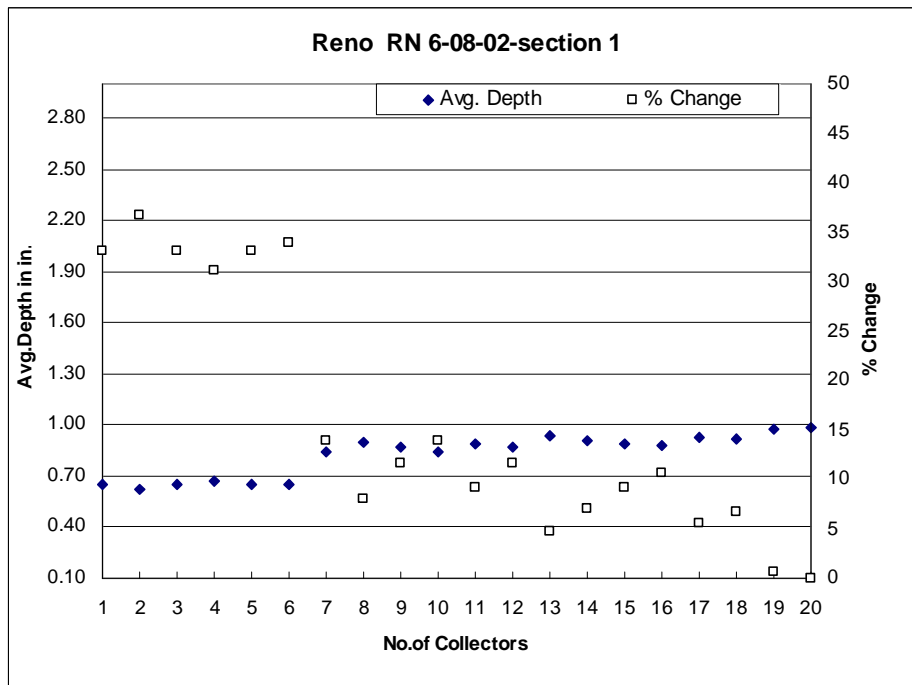
**Figure B.129.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-4 of the Pawnee PN 4-01-03 irrigation system data set.



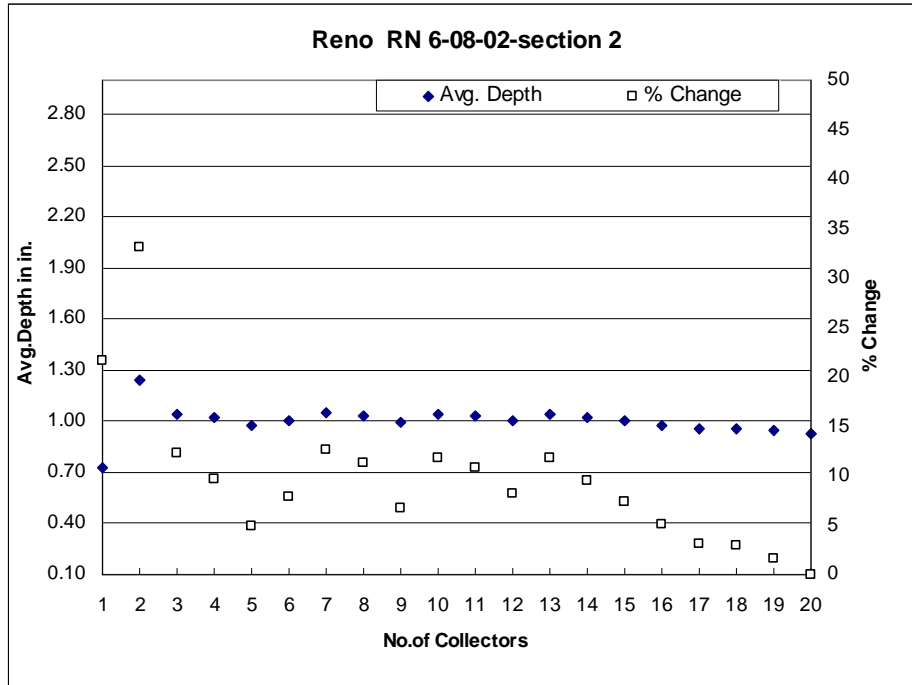
**Figure B.130.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-5 of the Pawnee PN 4-01-03 irrigation system data set.



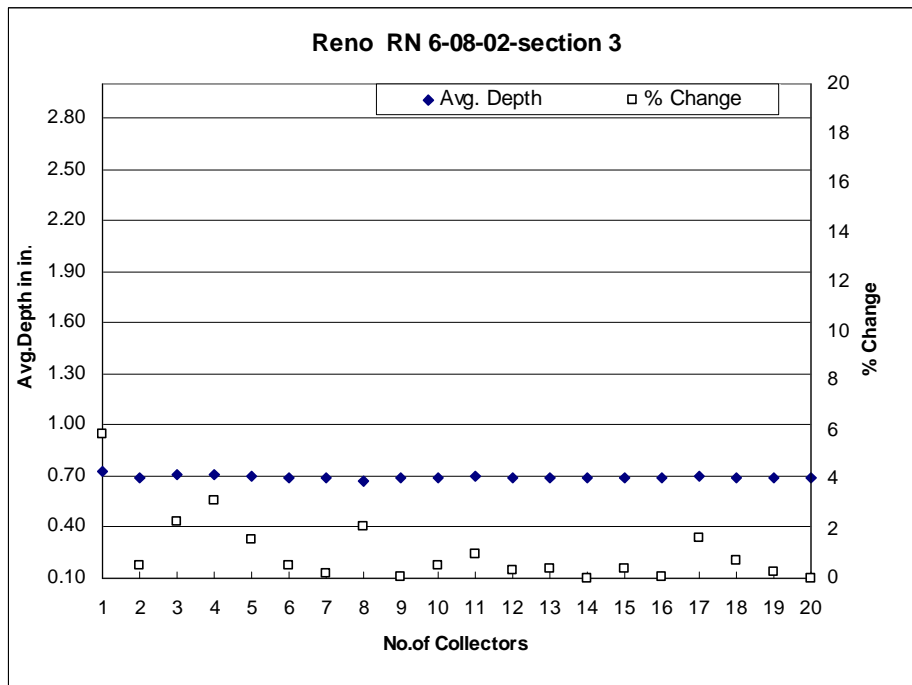
**Figure B.131.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-6 of the Pawnee PN 4-01-03 irrigation system data set.



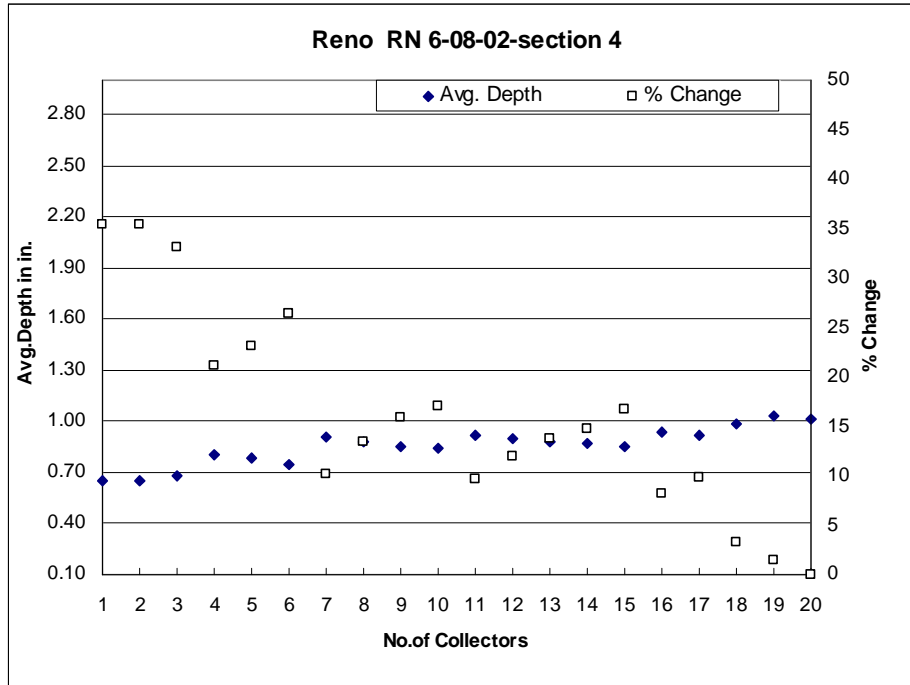
**Figure B.132.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-1 of the Reno RN 6-08-02 irrigation system data set.



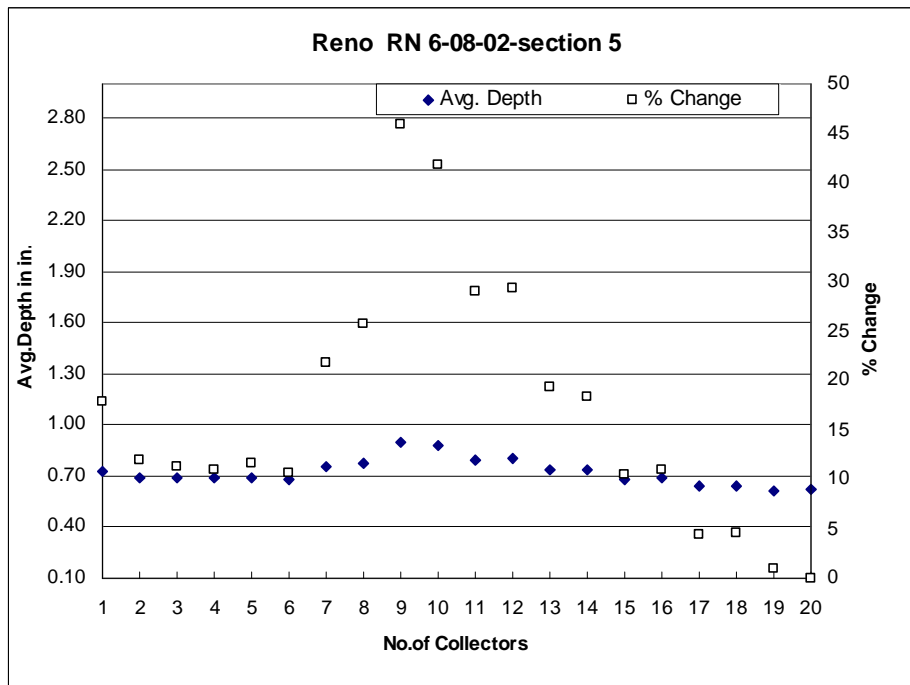
**Figure B.133.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-2 of the Reno RN 6-08-02 irrigation system data set.



**Figure B.134.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-3 of the Reno RN 6-08-02 irrigation system data set.

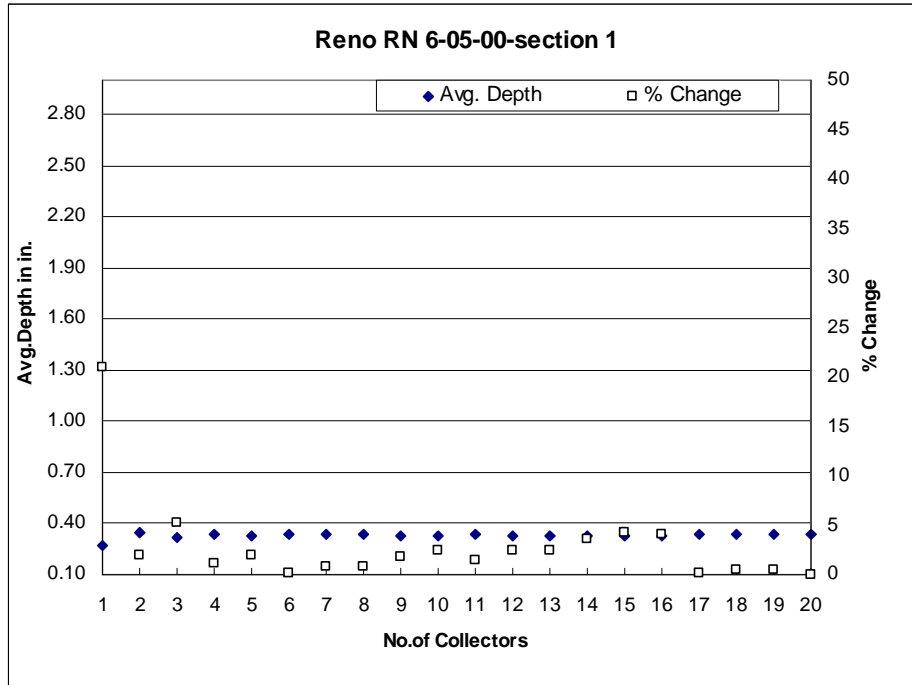


**Figure B.135.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-4 of the Reno RN 6-08-02 irrigation system data set.

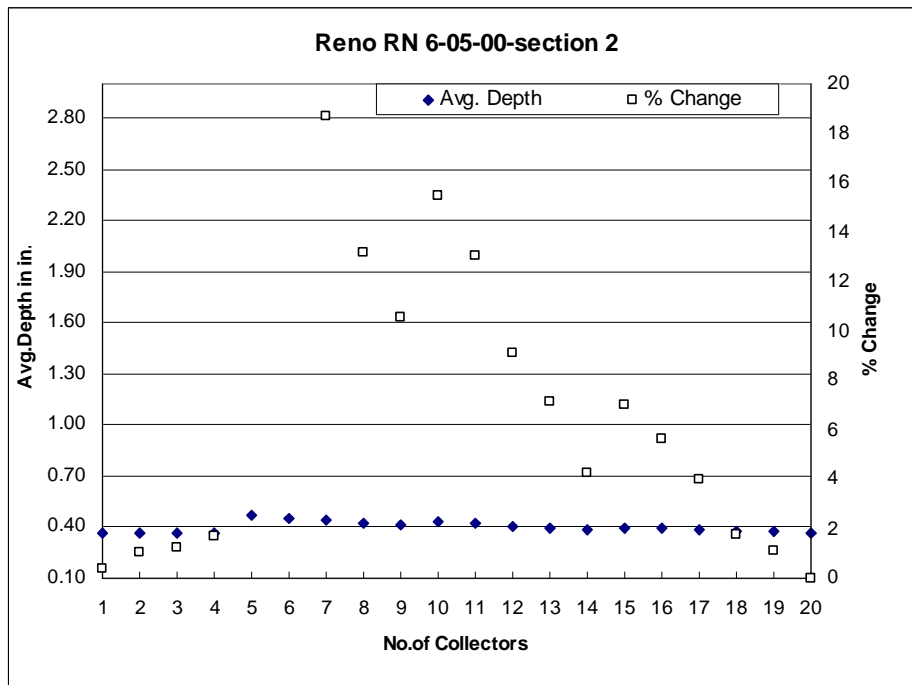


**Figure B.136.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-5 of the Reno RN 6-08-02 irrigation system data set.

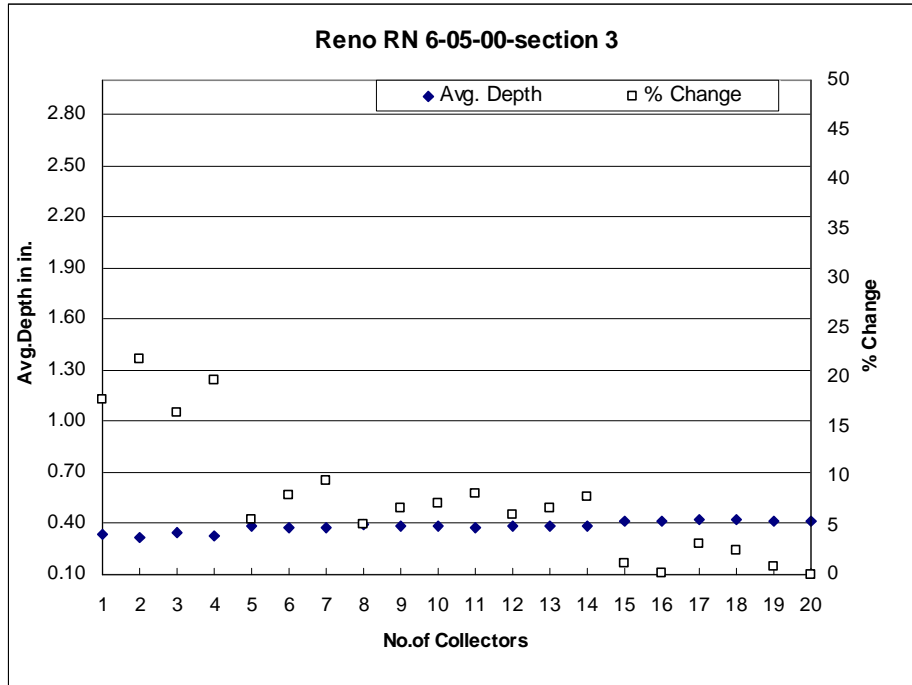




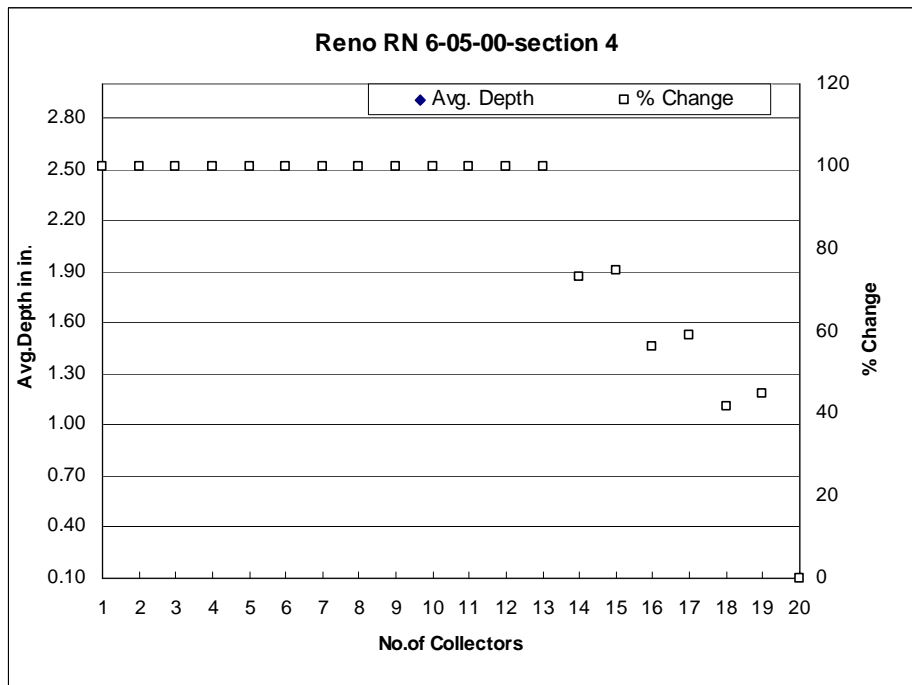
**Figure B.137.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-1 of the Reno RN 6-05-00 irrigation system data set.



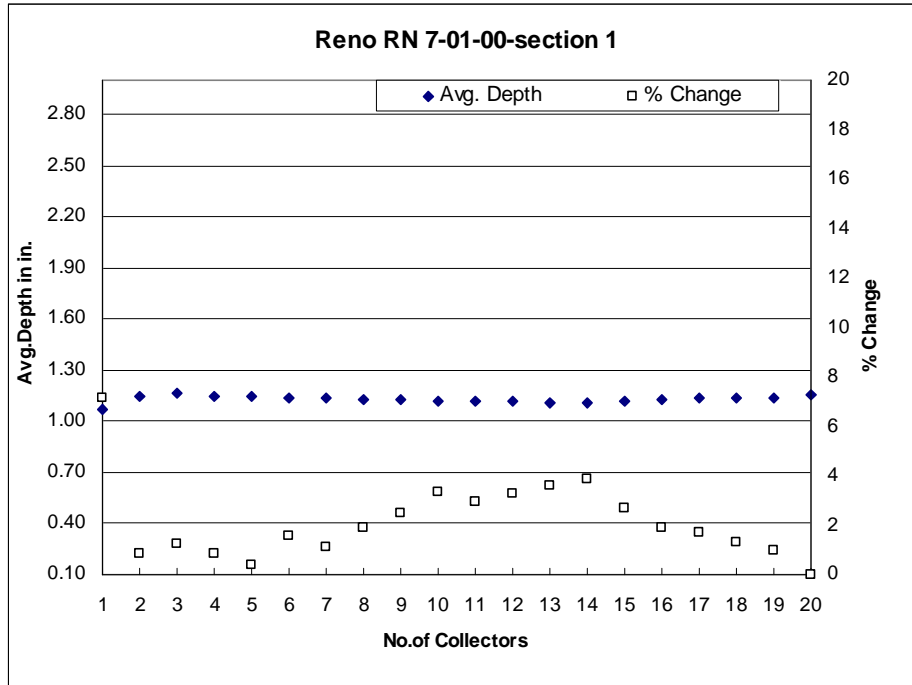
**Figure B.138.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-2 of the Reno RN 6-05-00 irrigation system data set.



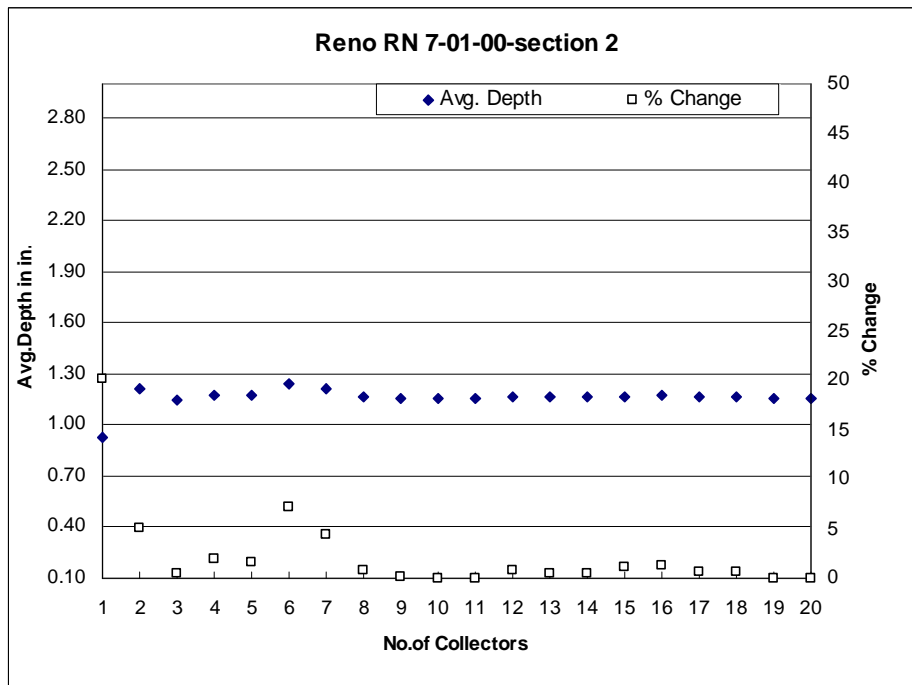
**Figure B.139.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-3 of the Reno RN 6-05-00 irrigation system data set.



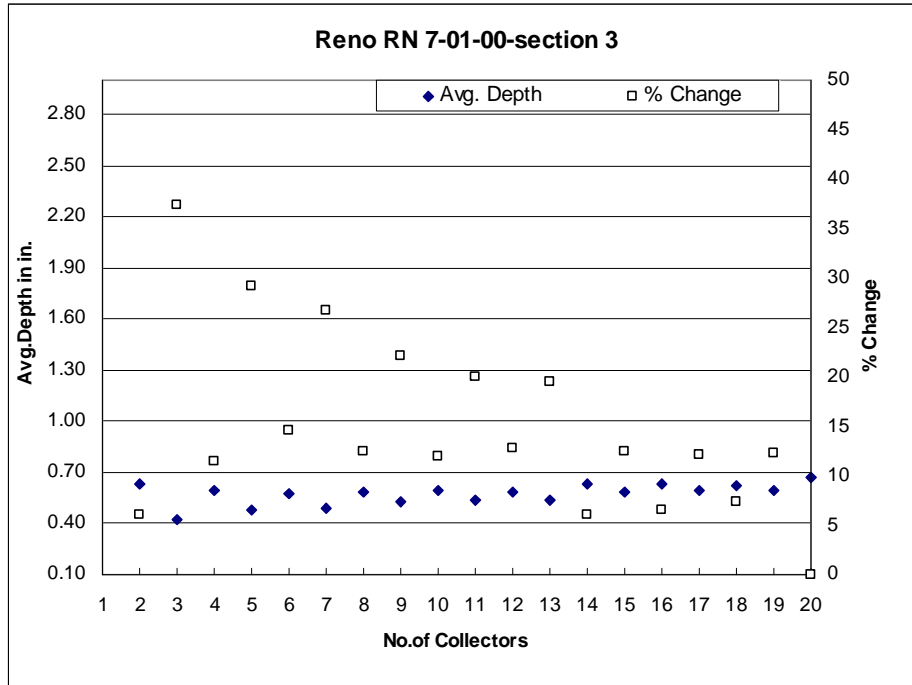
**Figure B.140.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-4 of the Reno RN 6-05-00 irrigation system data set.



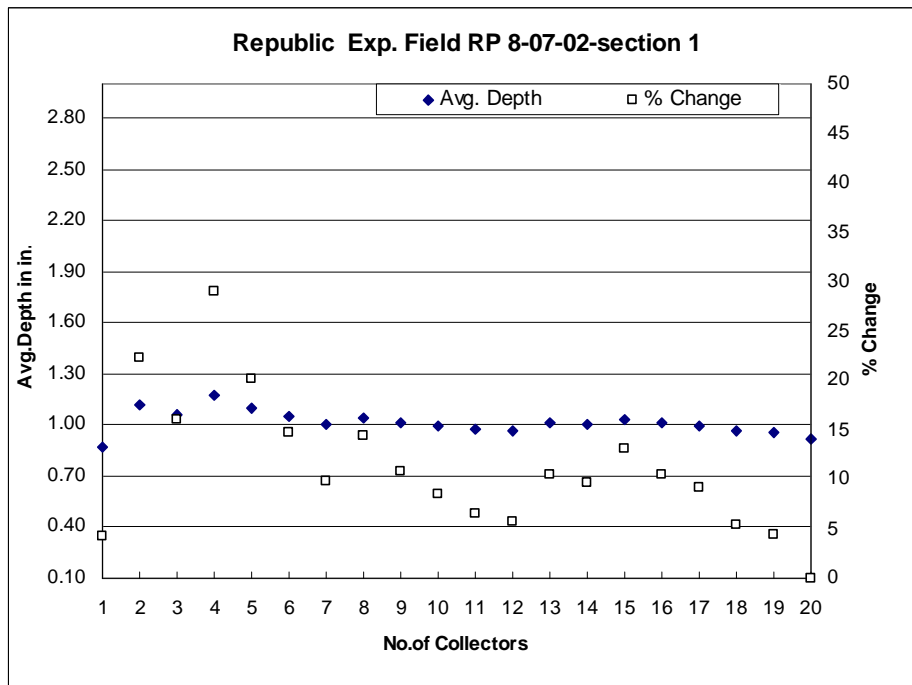
**Figure B.141.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-1 of the Reno RN 7-01-00 irrigation system data set.



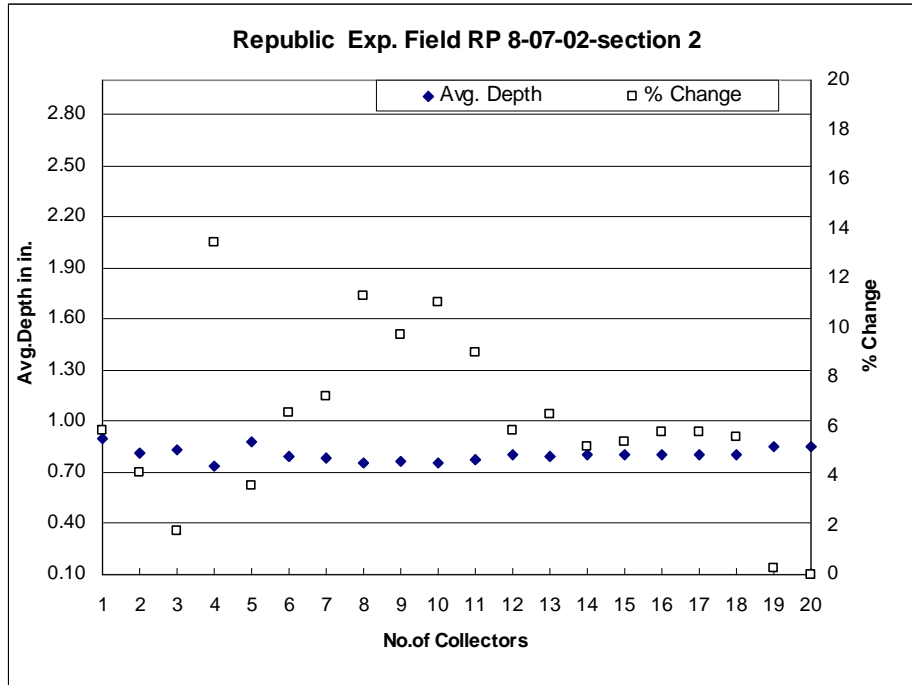
**Figure B.142.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-2 of the Reno RN 7-01-00 irrigation system data set.



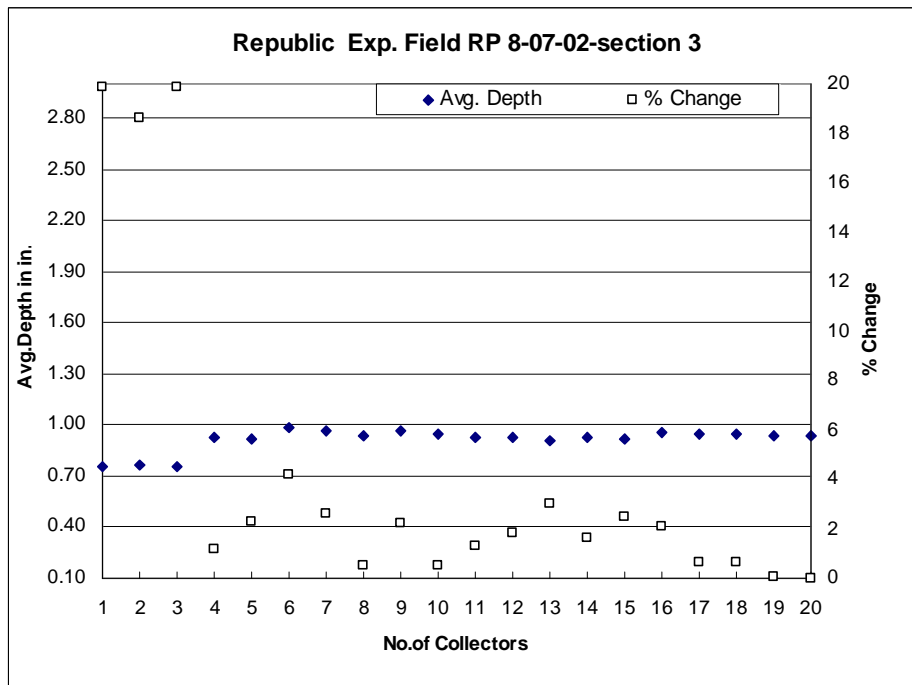
**Figure B.143.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-3 of the Reno RN 7-01-00 irrigation system data set.



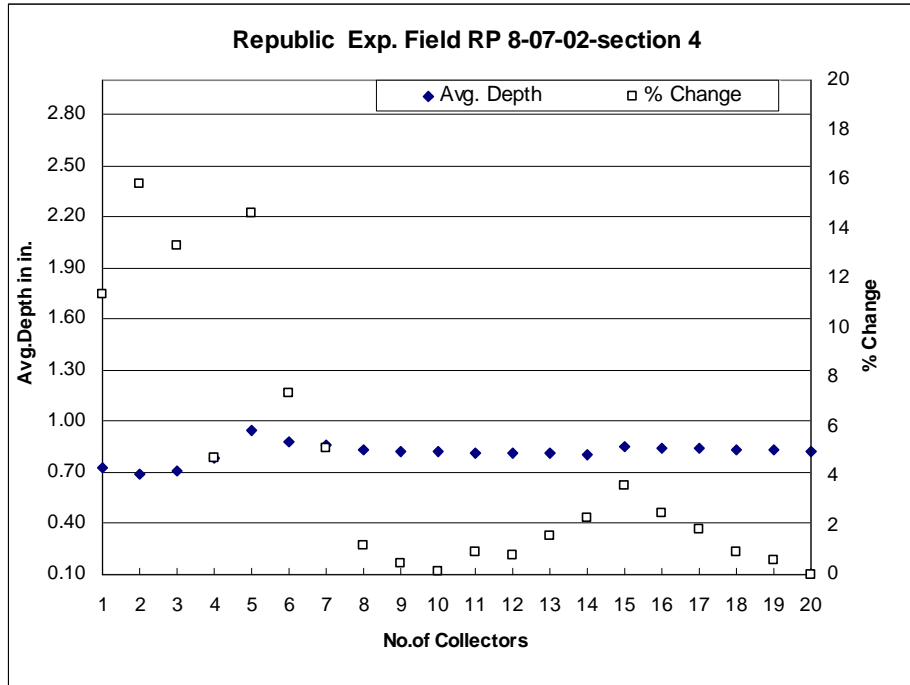
**Figure B.144.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-1 of the Republic Exp. Field RP 8-07-02 irrigation system data set.



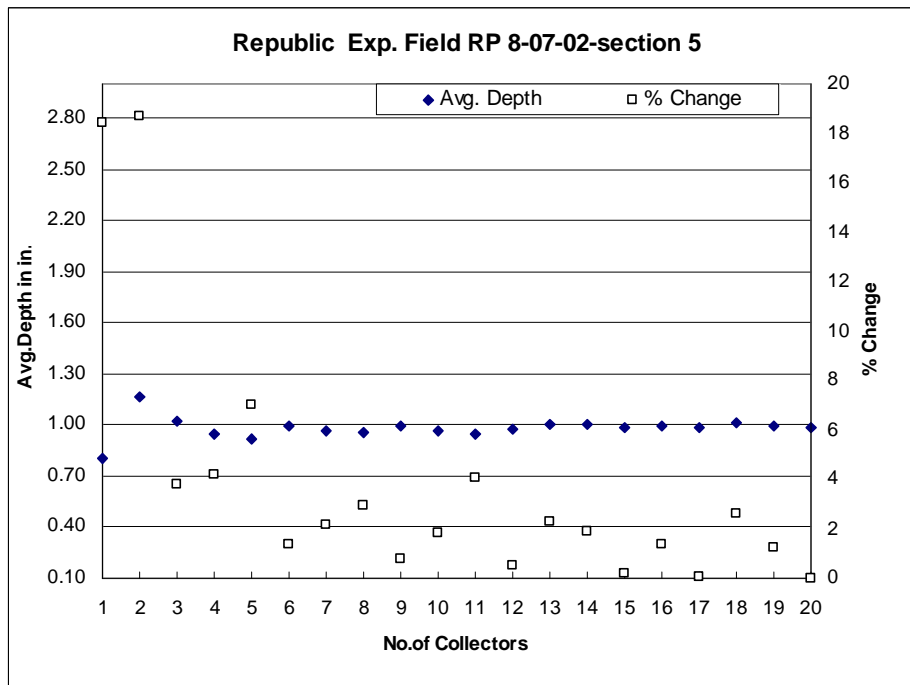
**Figure B.145.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-2 of the Republic Exp. Field RP 8-07-02 irrigation system data set.



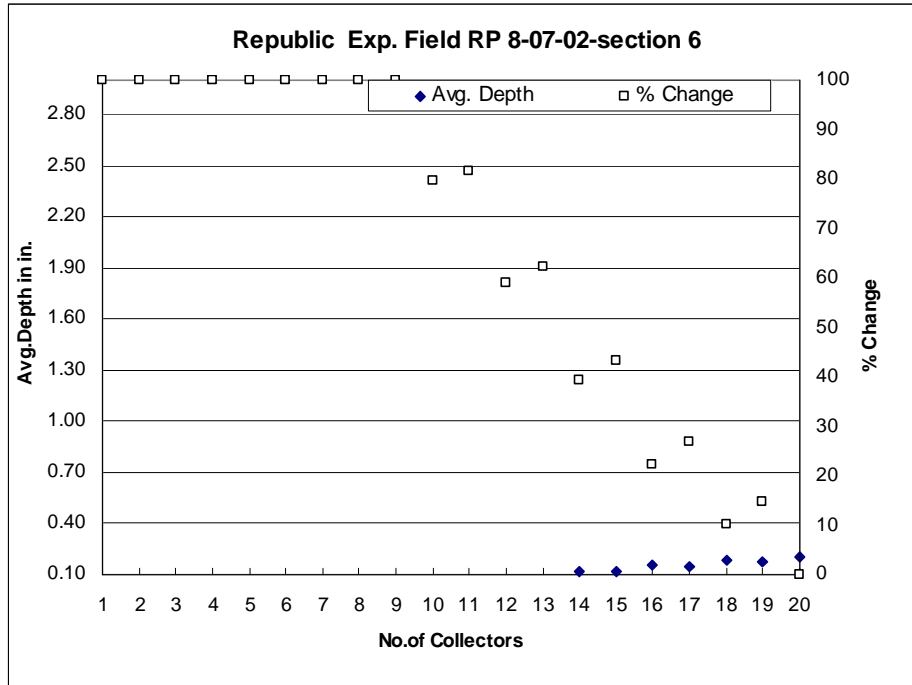
**Figure B.146.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-3 of the Republic Exp. Field RP 8-07-02 irrigation system data set.



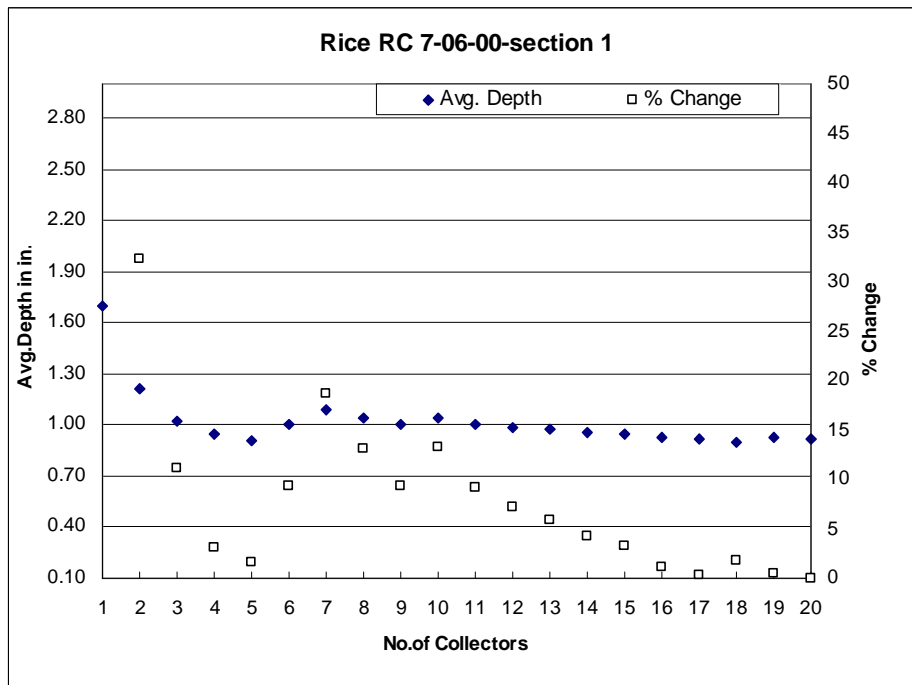
**Figure B.147.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-4 of the Republic Exp. Field RP 8-07-02 irrigation system data set.



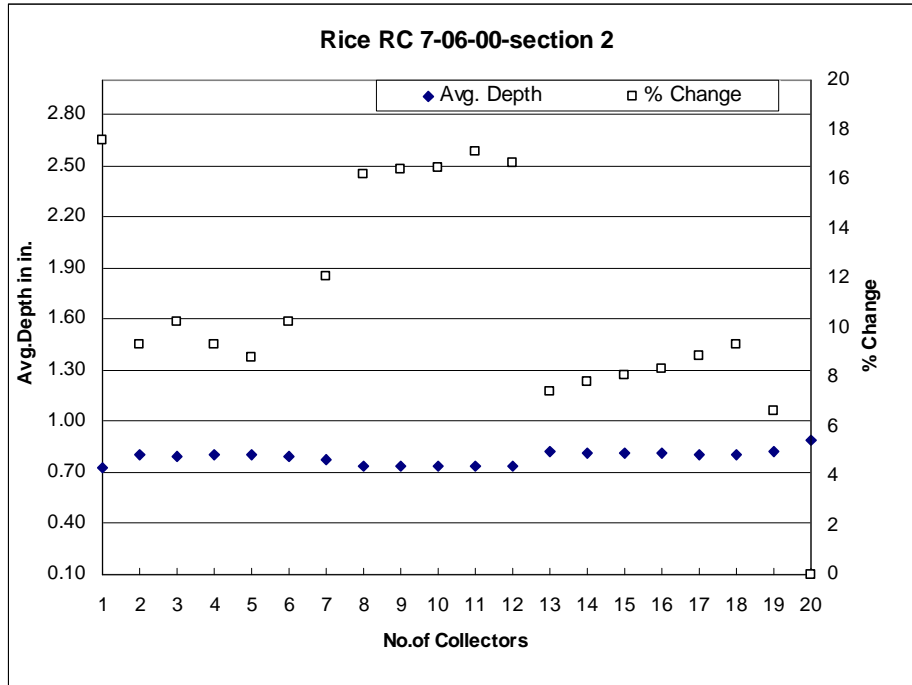
**Figure B.148.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-5 of the Republic Exp. Field RP 8-07-02 irrigation system data set.



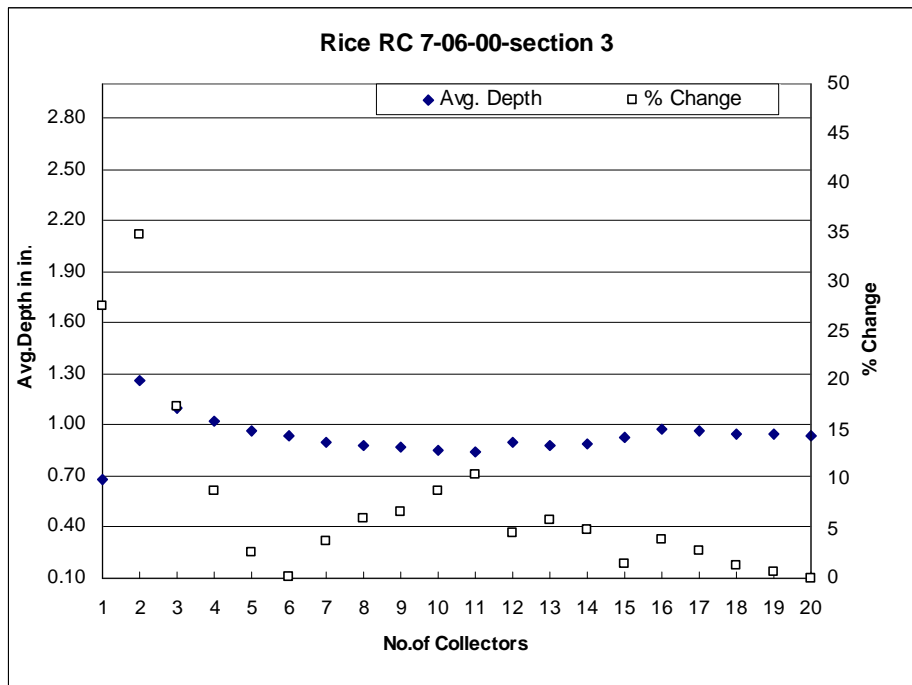
**Figure B.149.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-6 of the Republic Exp. Field RP 8-07-02 irrigation system data set.



**Figure B.150.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-1 of the Rice RC 7-06-00 irrigation system data set.

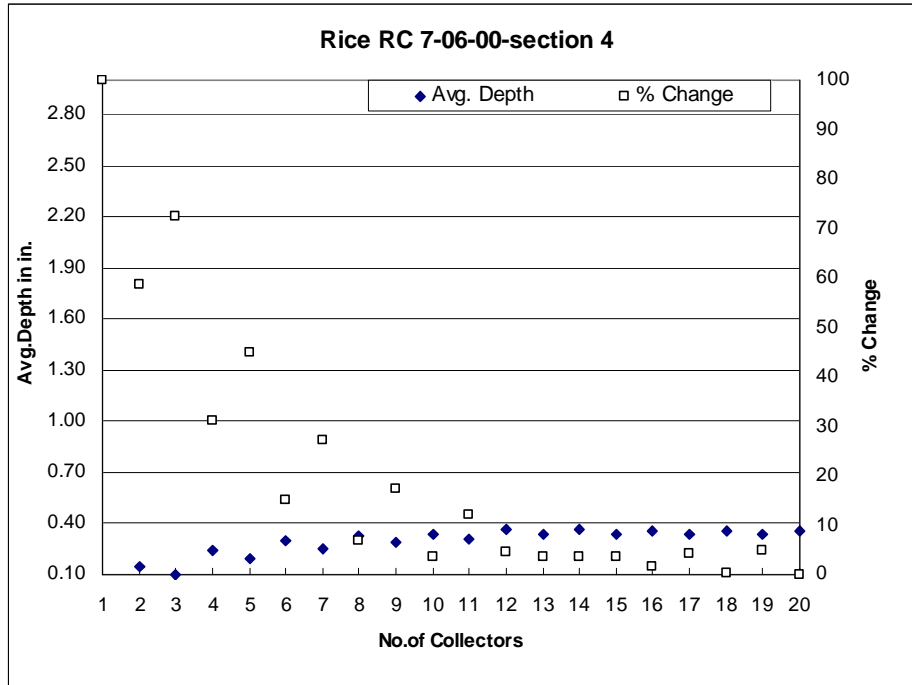


**Figure B.151.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-2 of the Rice RC 7-06-00 irrigation system data set.

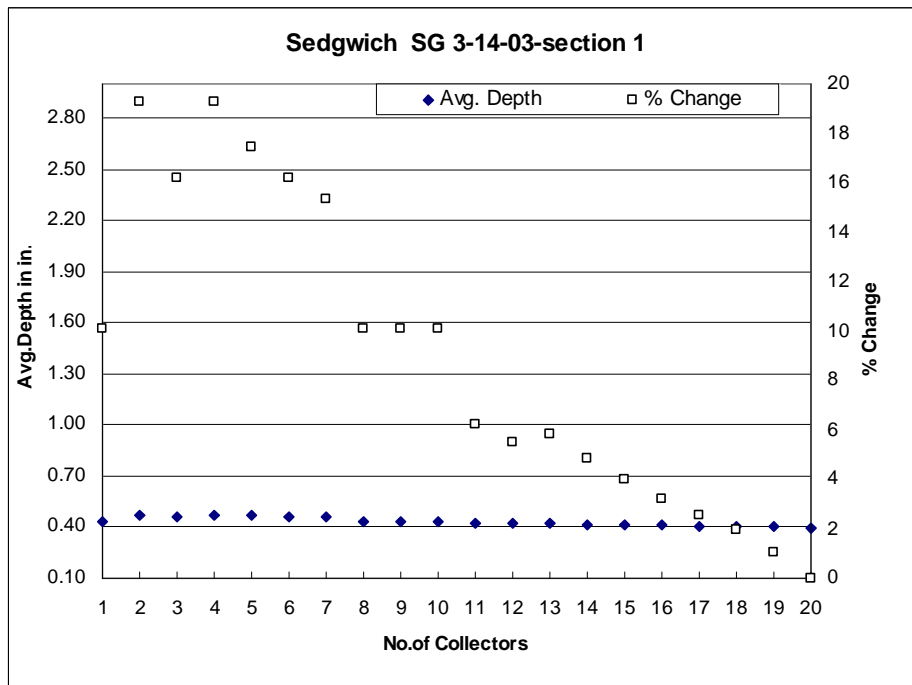


**Figure B.152.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-3 of the Rice RC 7-06-00 irrigation system data set.

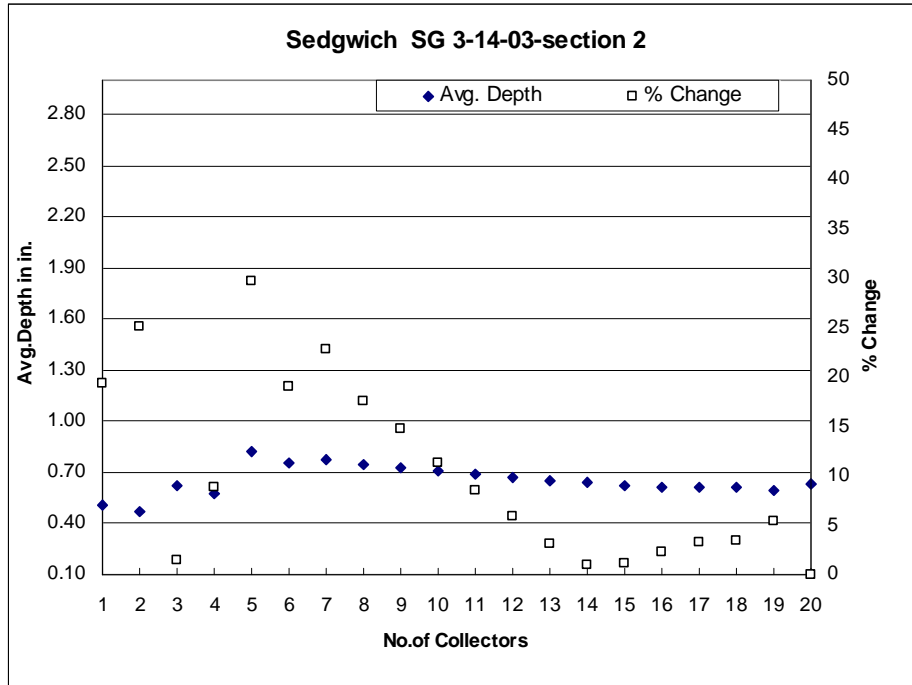




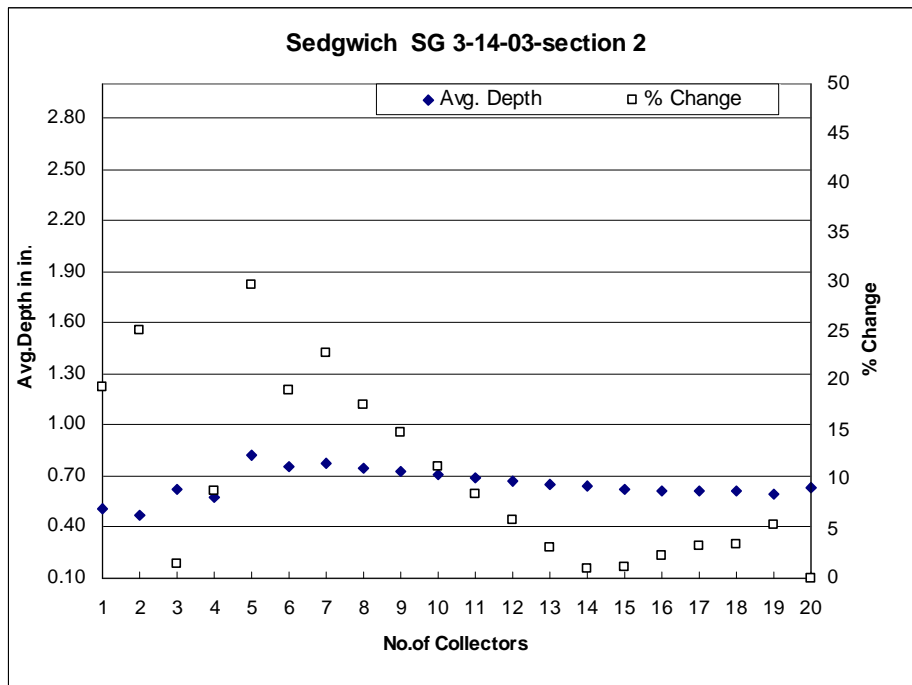
**Figure B.153.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-4 of the Rice RC 7-06-00 irrigation system data set.



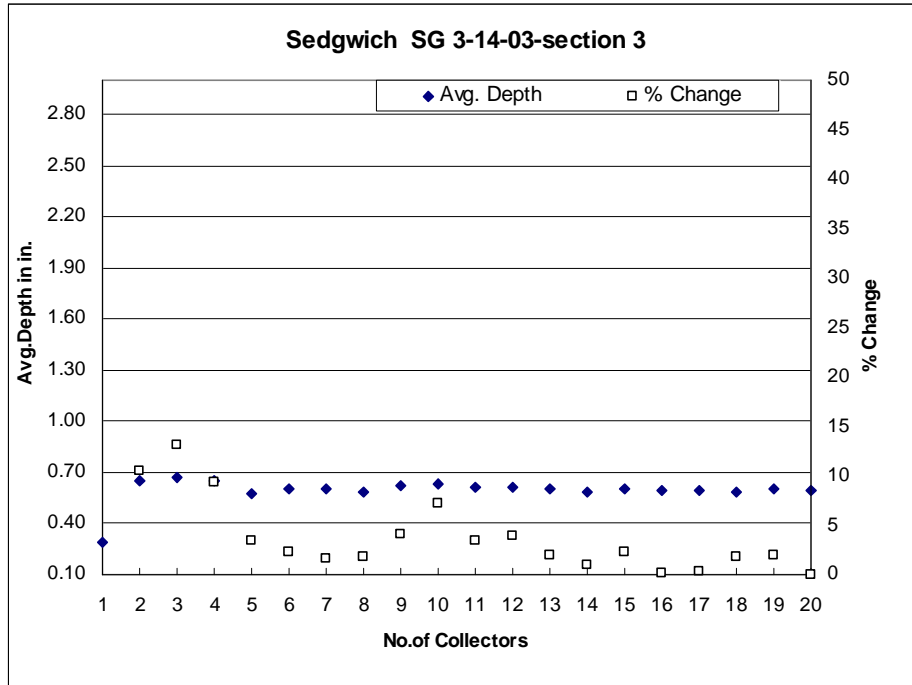
**Figure B.154.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-1 of the Sedgwick SG 3-14-03 irrigation system data set.



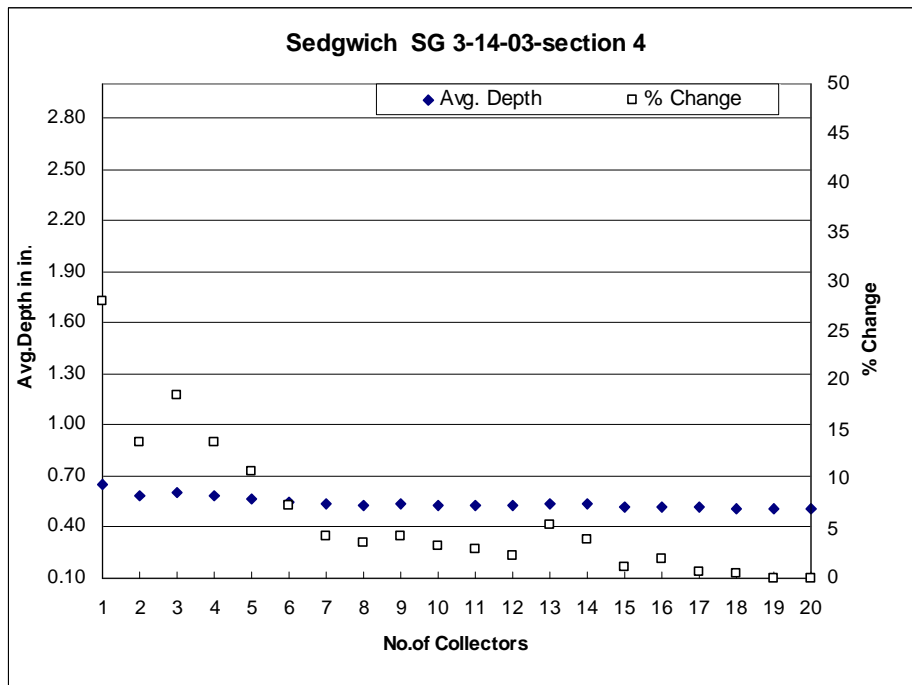
**Figure B.155.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-2 of the Sedgwich SG 3-14-03 irrigation system data set.



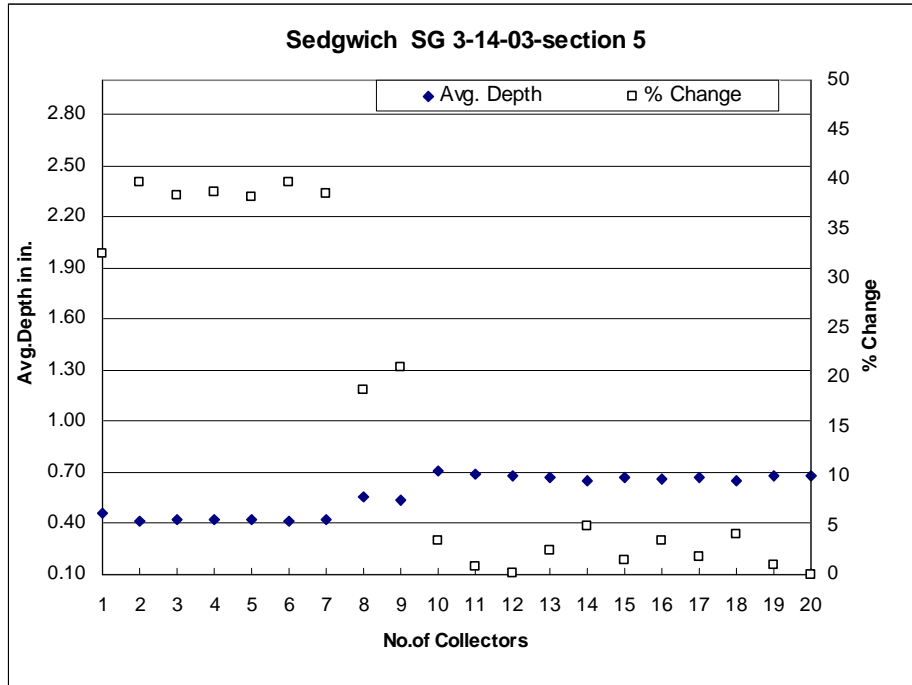
**Figure B.156.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-2 of the Sedgwich SG 3-14-03 irrigation system data set.



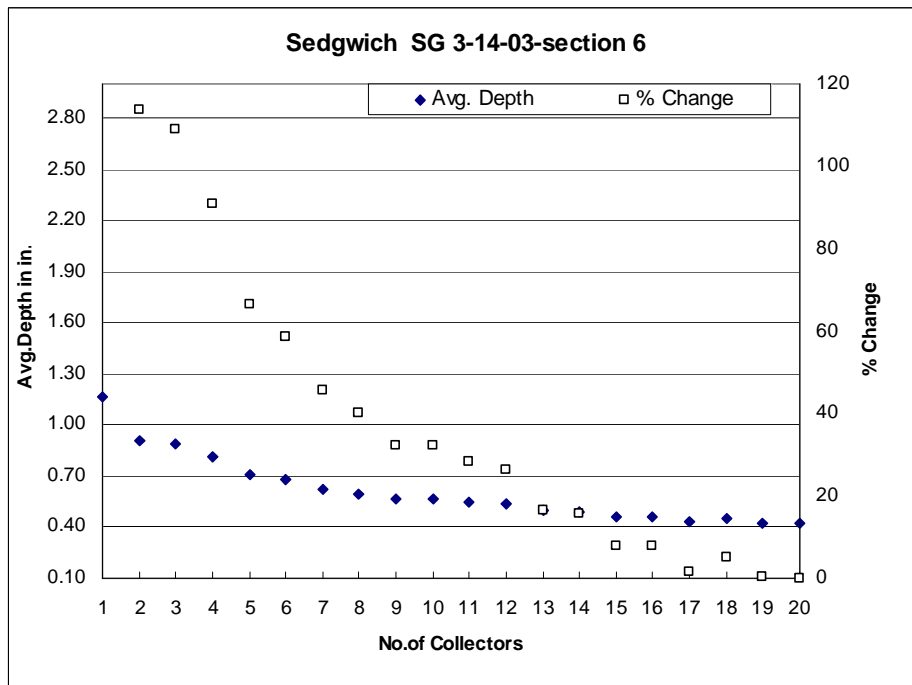
**Figure B.157.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-3 of the Sedgwich SG 3-14-03 irrigation system data set.



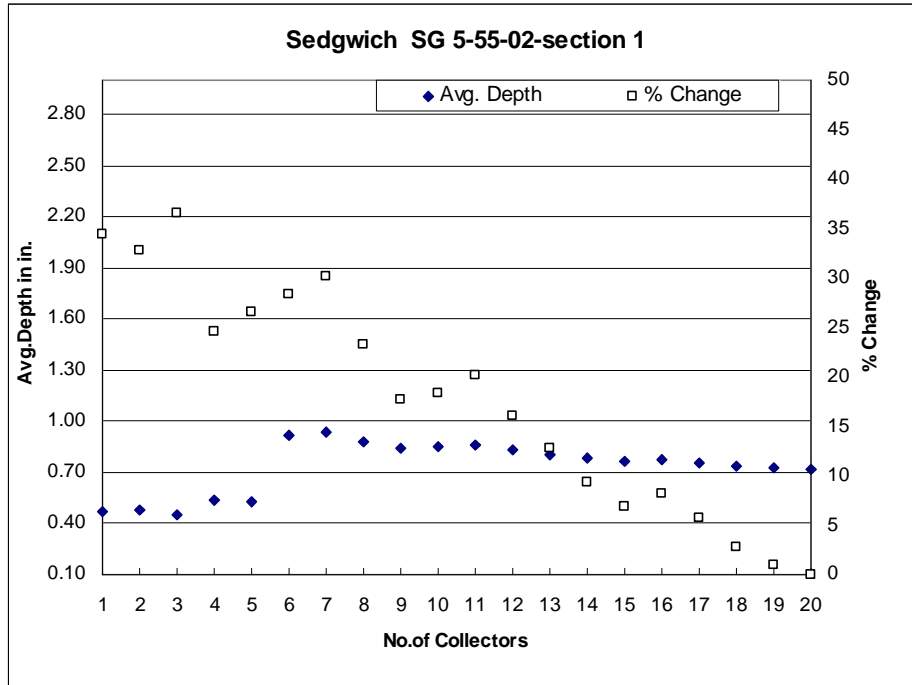
**Figure B.158.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-4 of the Sedgwich SG 3-14-03 irrigation system data set.



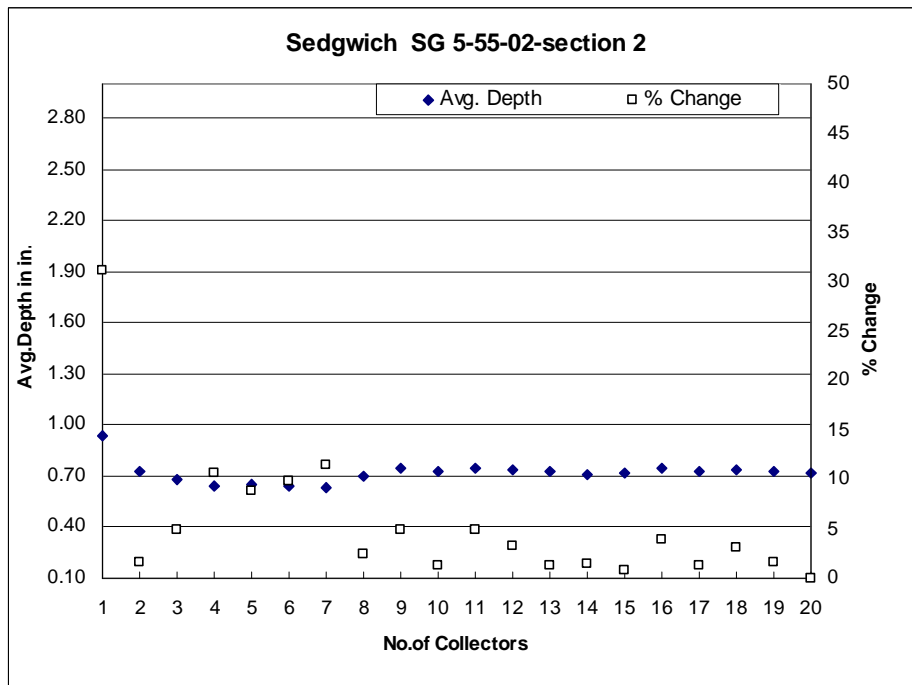
**Figure B.159.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-5 of the Sedgwick SG 3-14-03 irrigation system data set.



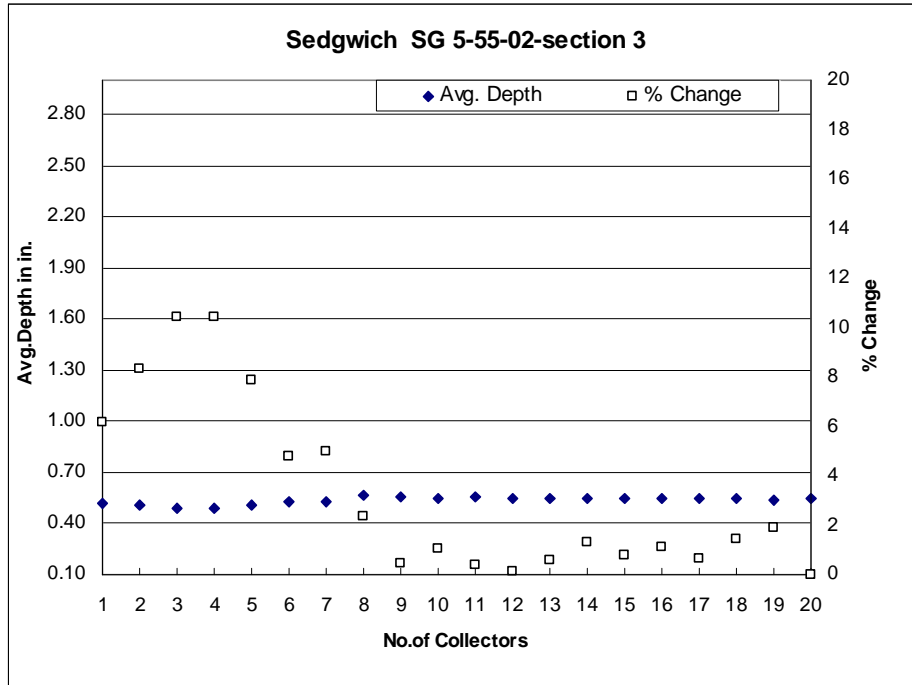
**Figure B.160.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-6 of the Sedgwick SG 3-14-03 irrigation system data set.



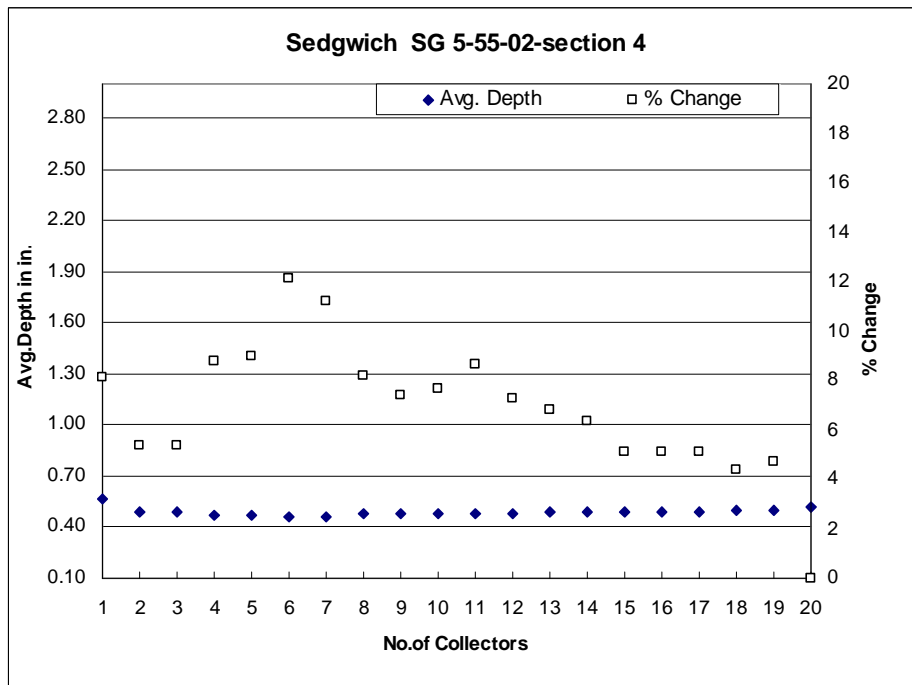
**Figure B.161.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-1 of the Sedgwich SG 5-55-02 irrigation system data set.



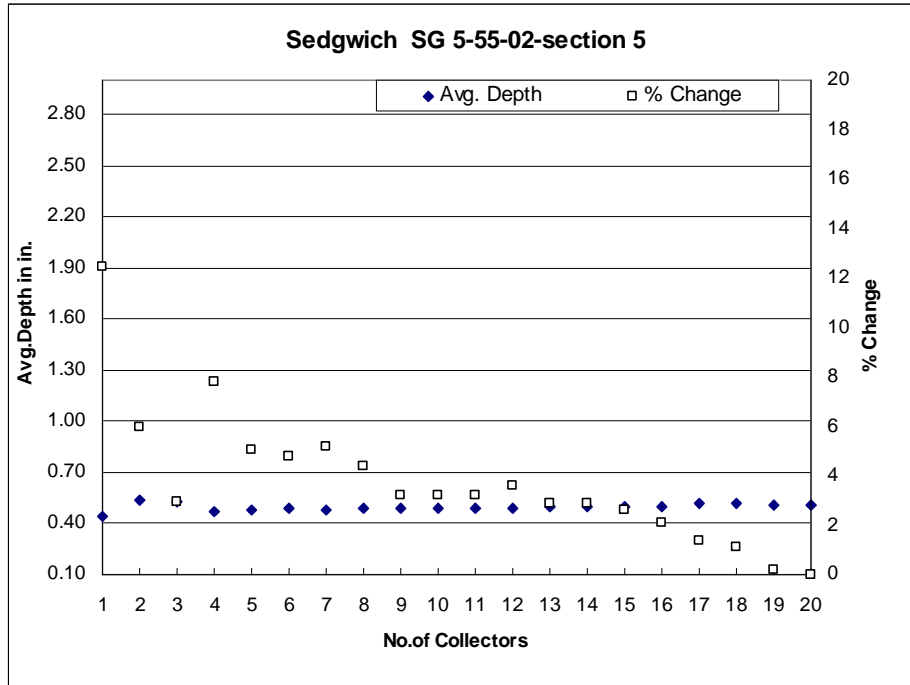
**Figure B.162.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-2 of the Sedgwich SG 5-55-02 irrigation system data set.



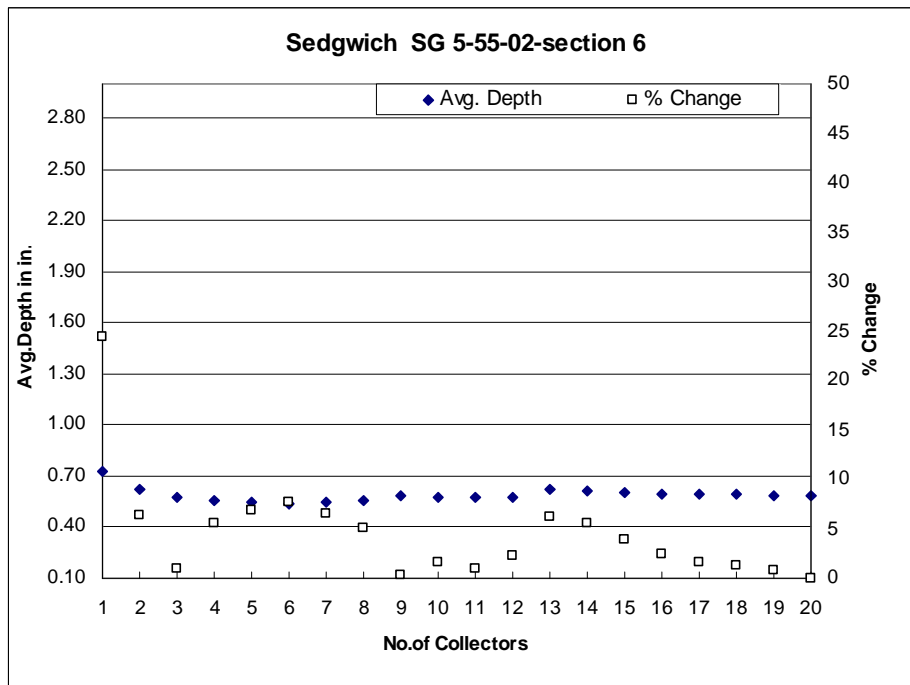
**Figure B.163.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-3 of the Sedgwich SG 5-55-02 irrigation system data set.



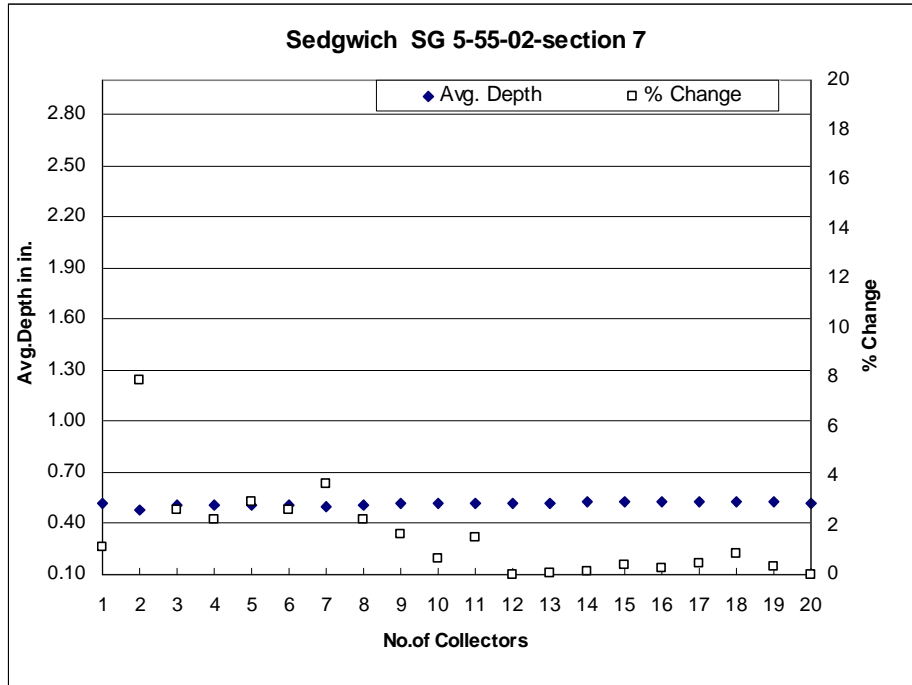
**Figure B.164.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-4 of the Sedgwich SG 5-55-02 irrigation system data set.



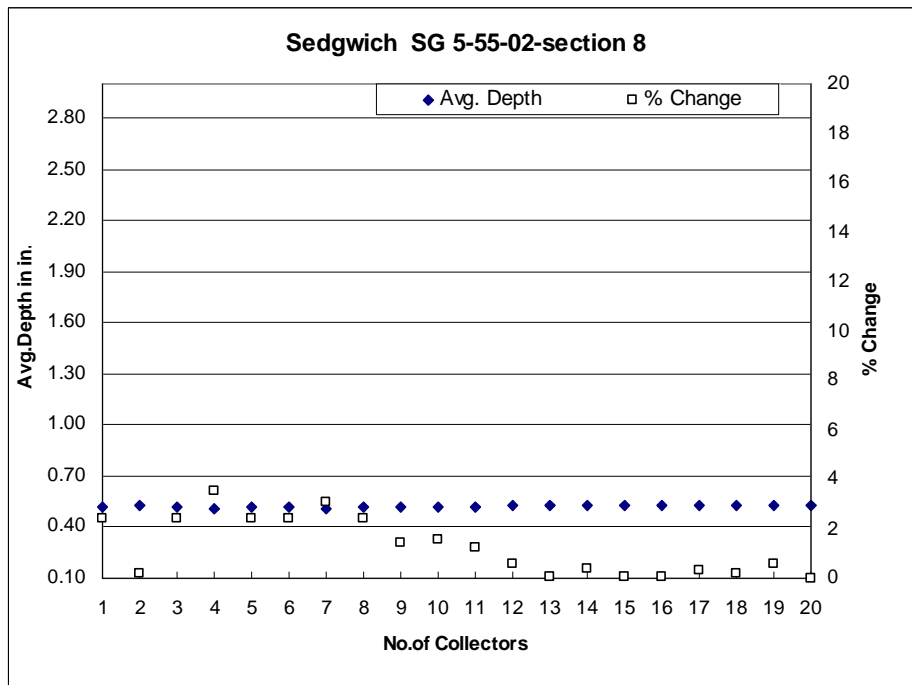
**Figure B.165.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-5 of the Sedgwich SG 5-55-02 irrigation system data set.



**Figure B.166.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-6 of the Sedgwich SG 5-55-02 irrigation system data set.

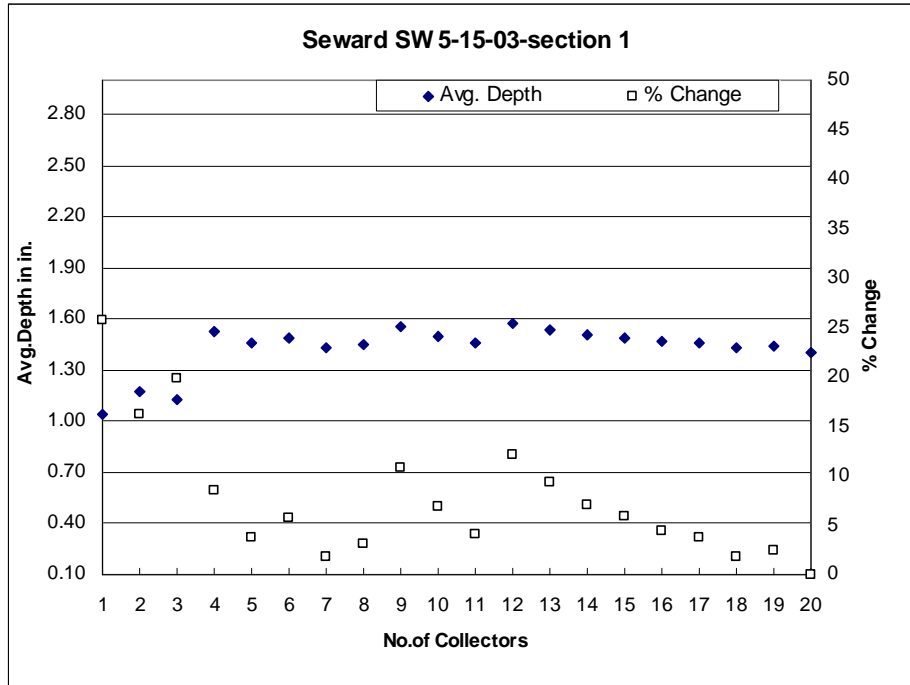


**Figure B.167.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-7 of the Sedgwick SG 5-55-02 irrigation system data set.

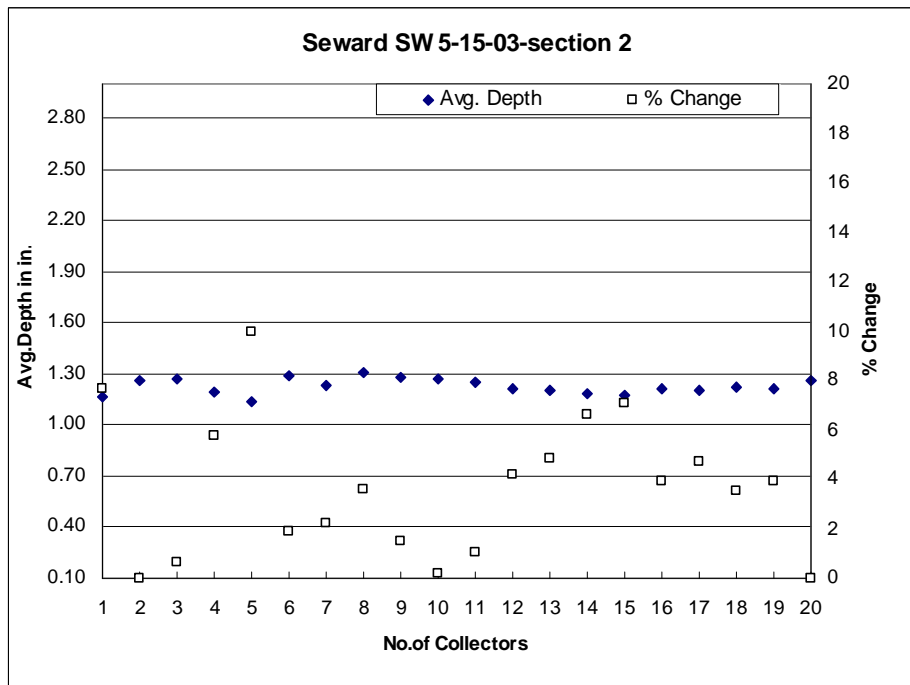


**Figure B.168.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-8 of the Sedgwick SG 5-55-02 irrigation system data set.

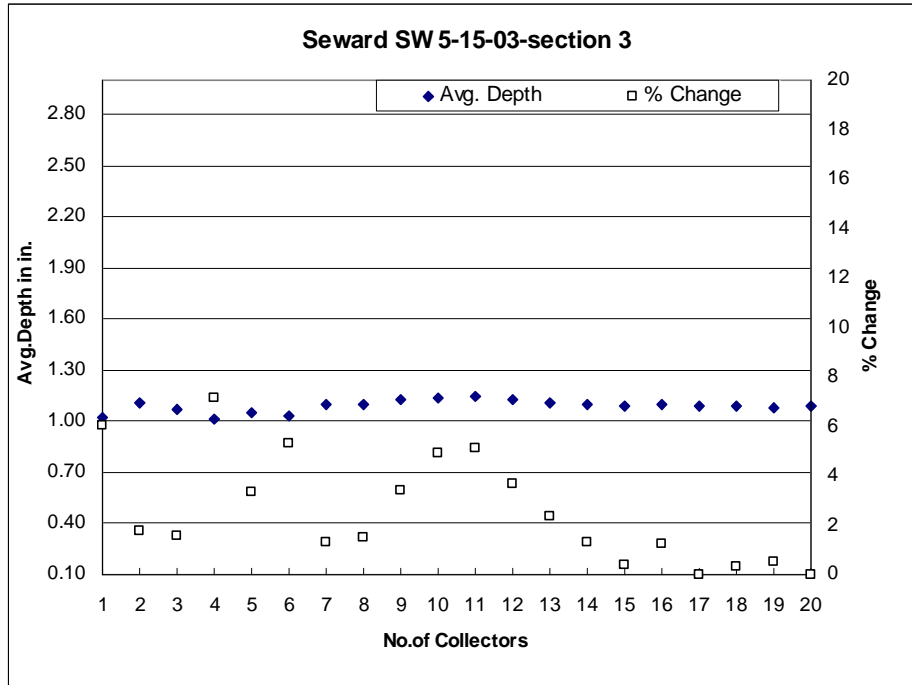




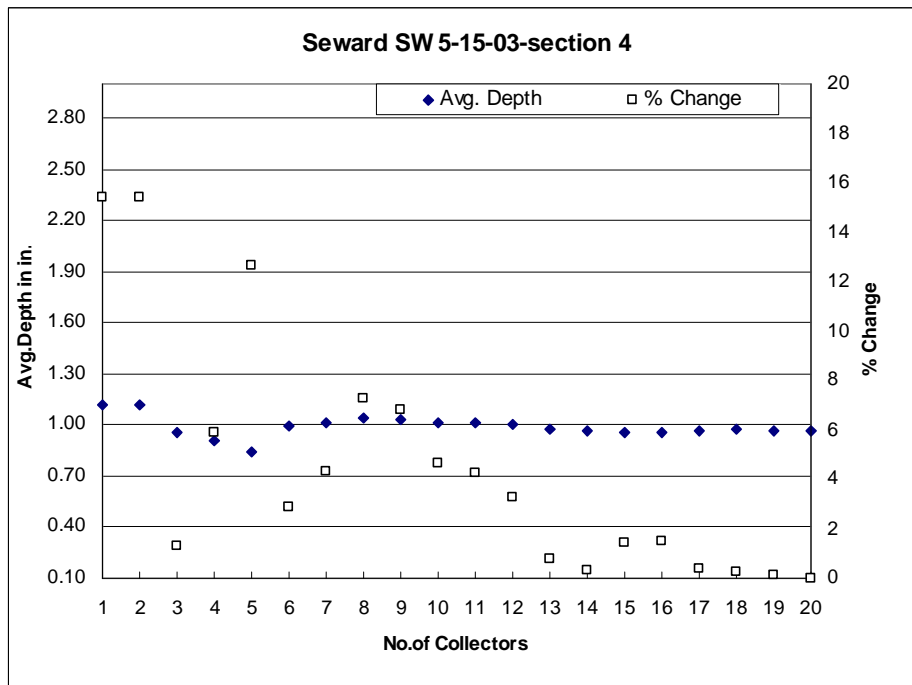
**Figure B.169.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-1 of the Seward SW 5-15-03 irrigation system data set.



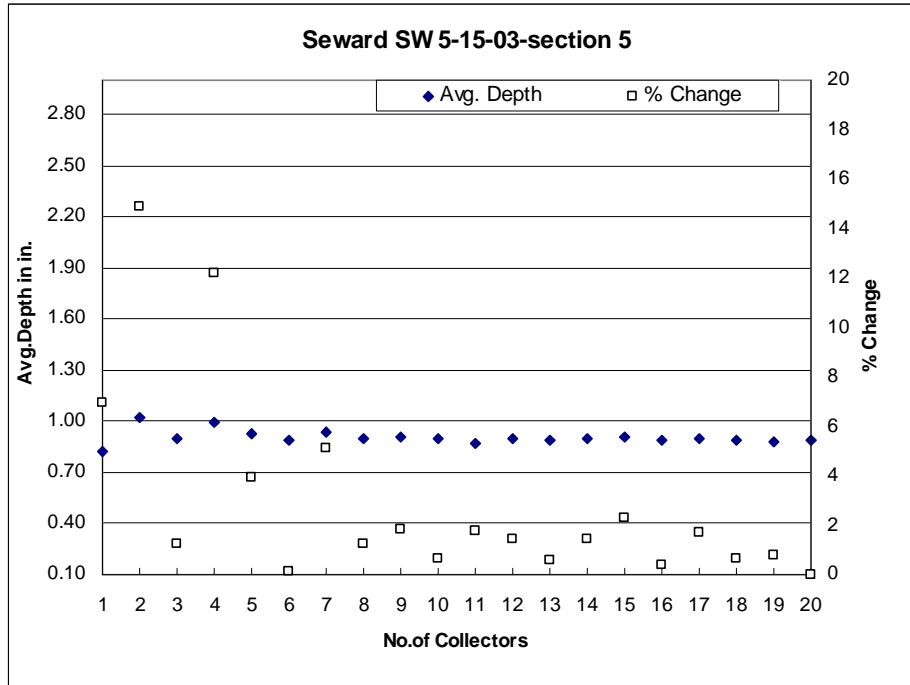
**Figure B.170.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-2 of the Seward SW 5-15-03 irrigation system data set.



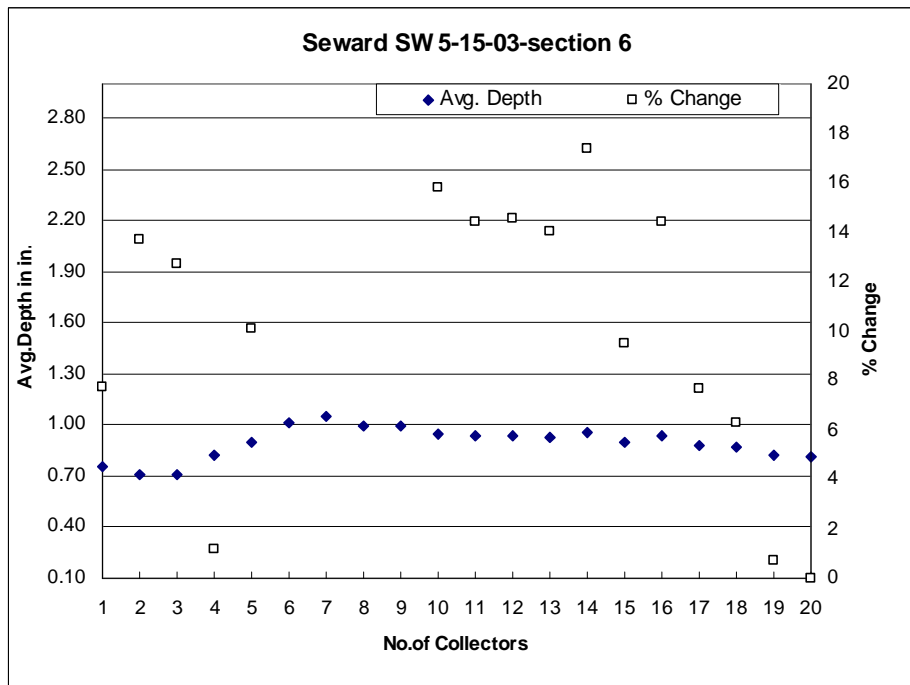
**Figure B.171.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-3 of the Seward SW 5-15-03 irrigation system data set.



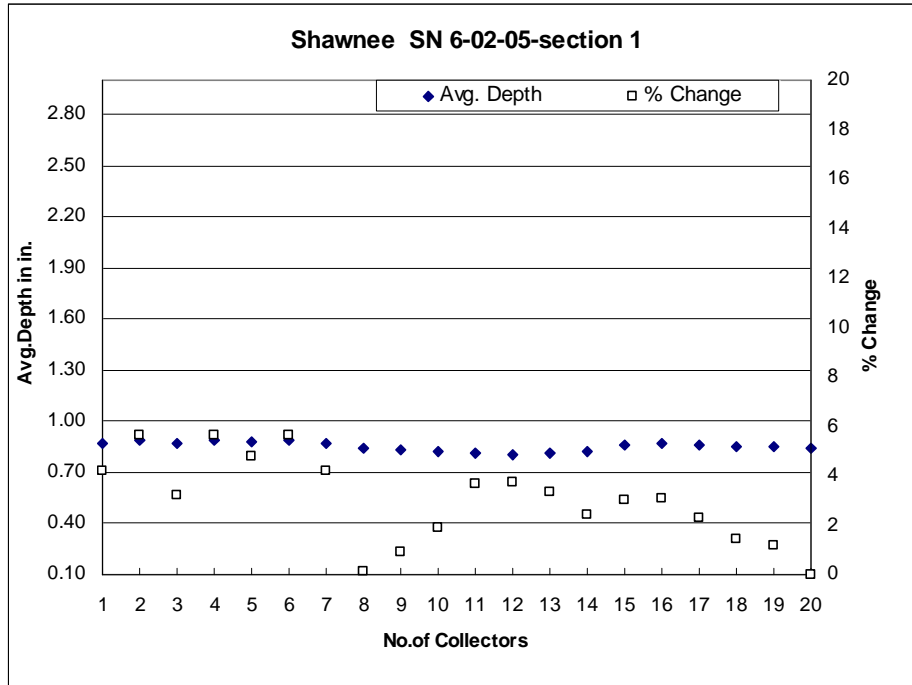
**Figure B.172.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-4 of the Seward SW 5-15-03 irrigation system data set.



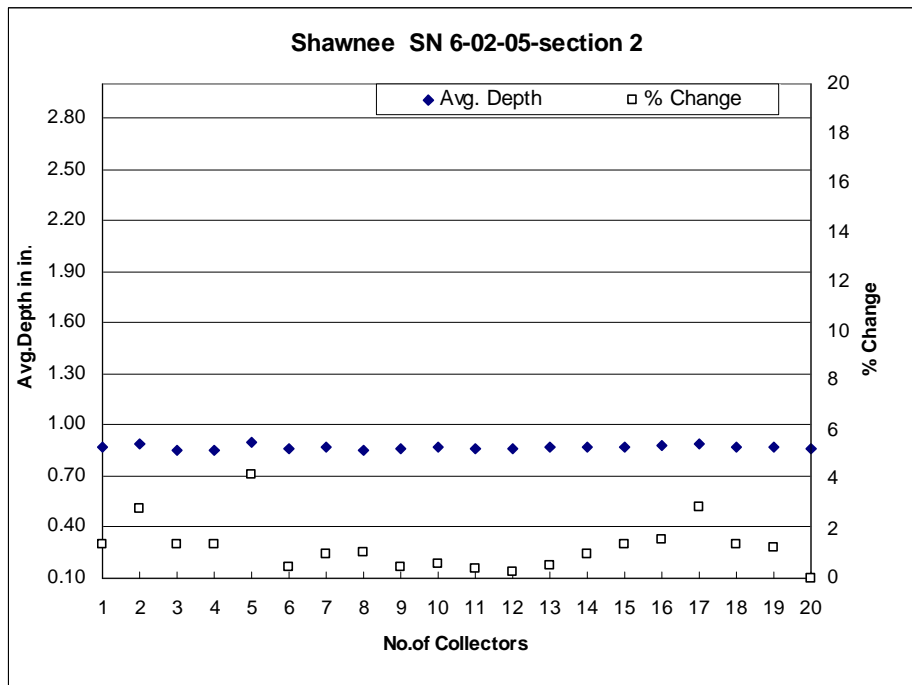
**Figure B.173.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-5 of the Seward SW 5-15-03 irrigation system data set.



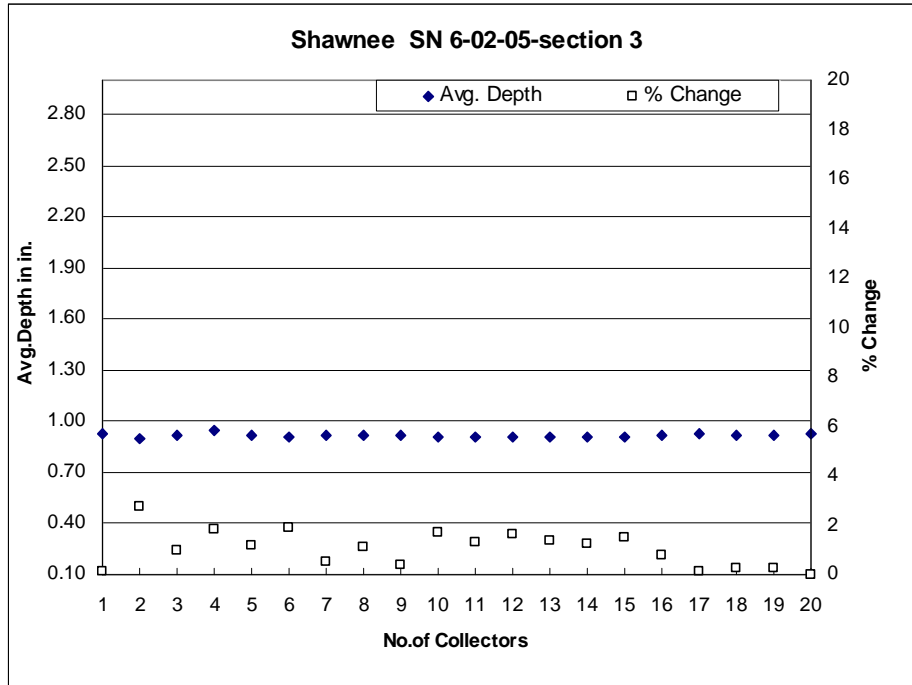
**Figure B.174.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-6 of the Seward SW 5-15-03 irrigation system data set.



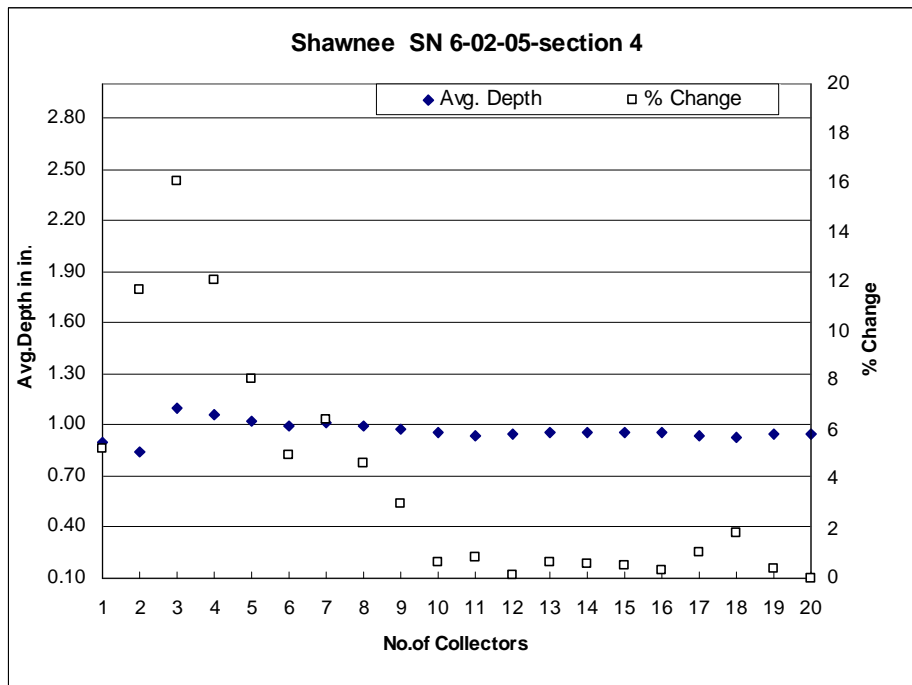
**Figure B.175.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-1 of the Shawnee SN 6-02-05 irrigation system data set.



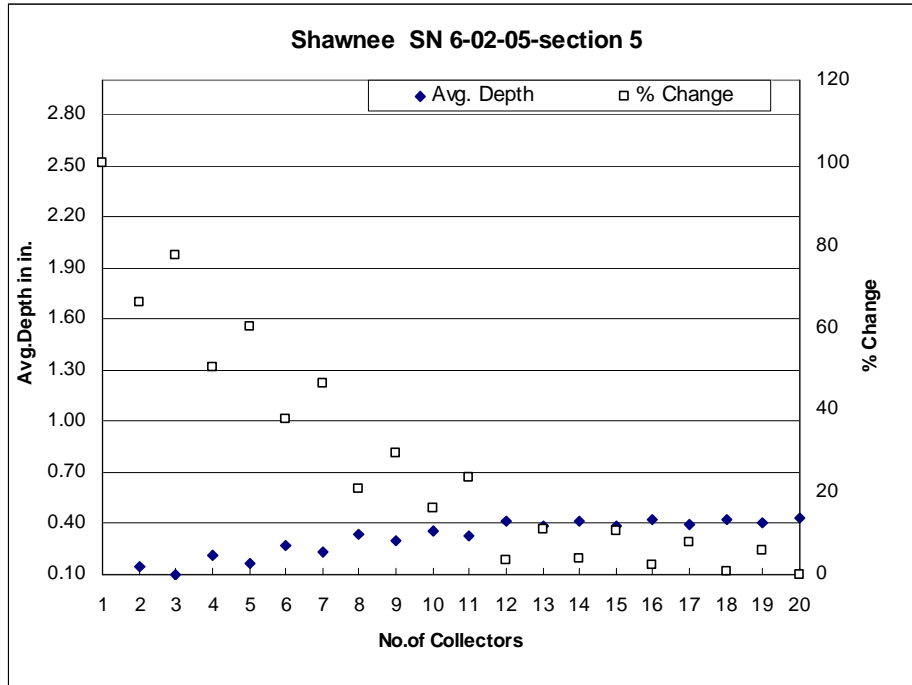
**Figure B.176.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-2 of the Shawnee SN 6-02-05 irrigation system data set.



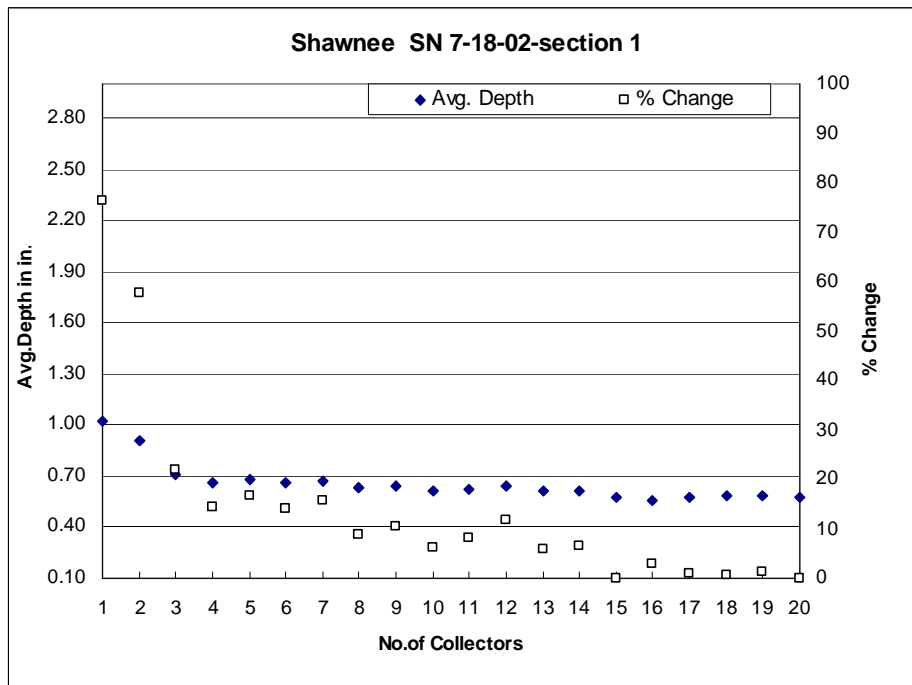
**Figure B.177.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-3 of the Shawnee SN 6-02-05 irrigation system data set.



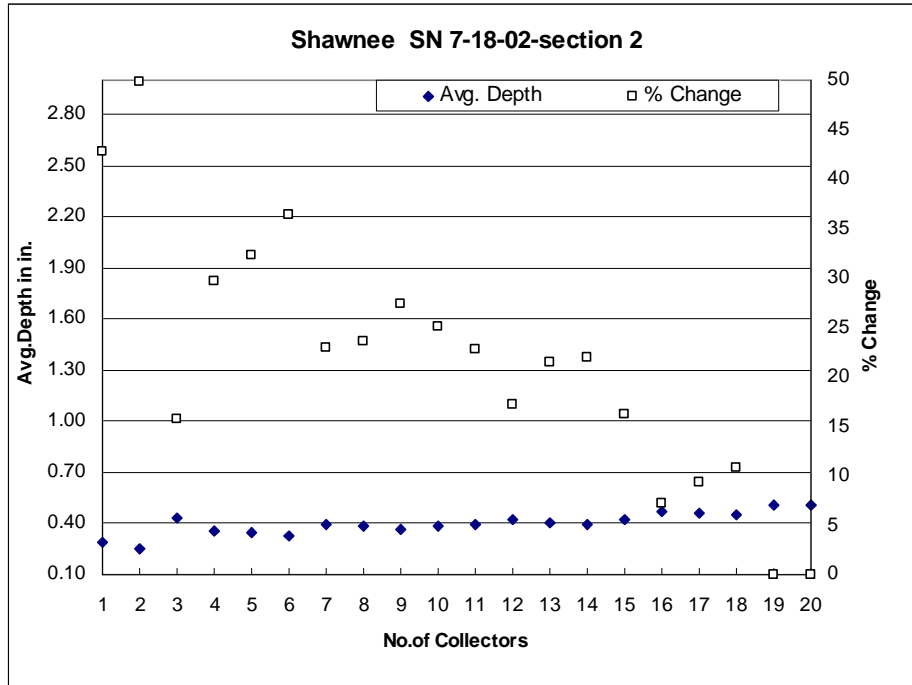
**Figure B.178.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-4 of the Shawnee SN 6-02-05 irrigation system data set.



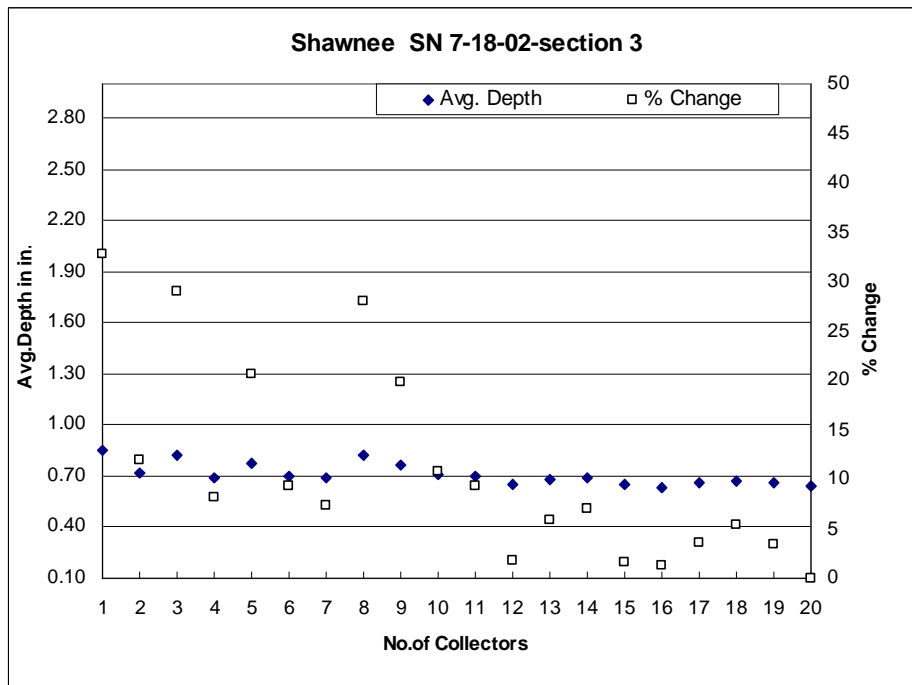
**Figure B.179.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-5 of the Shawnee SN 6-02-05 irrigation system data set.



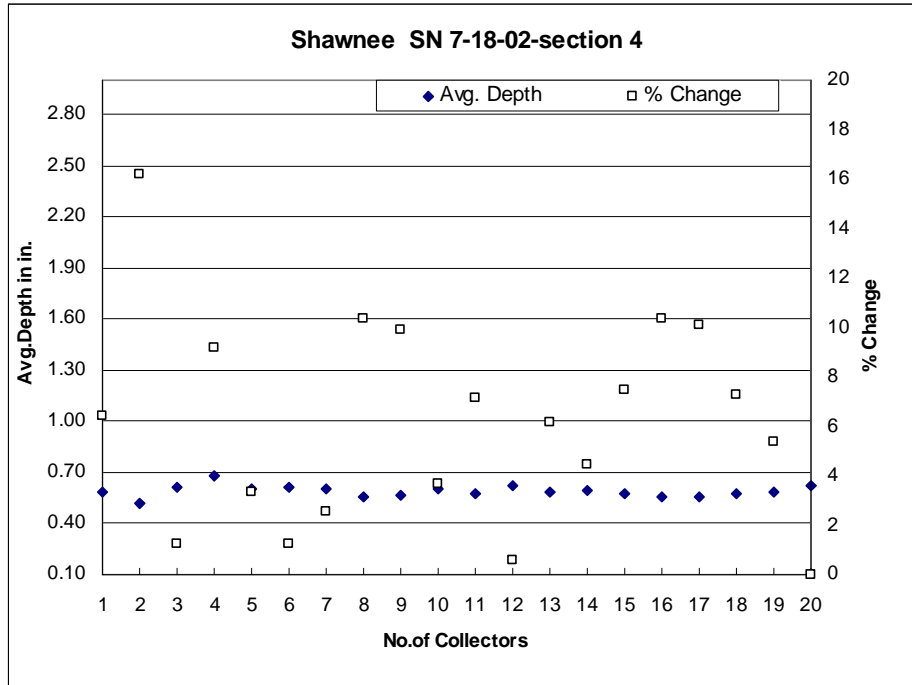
**Figure B.180.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-1 of the Shawnee SN 7-18-02 irrigation system data set.



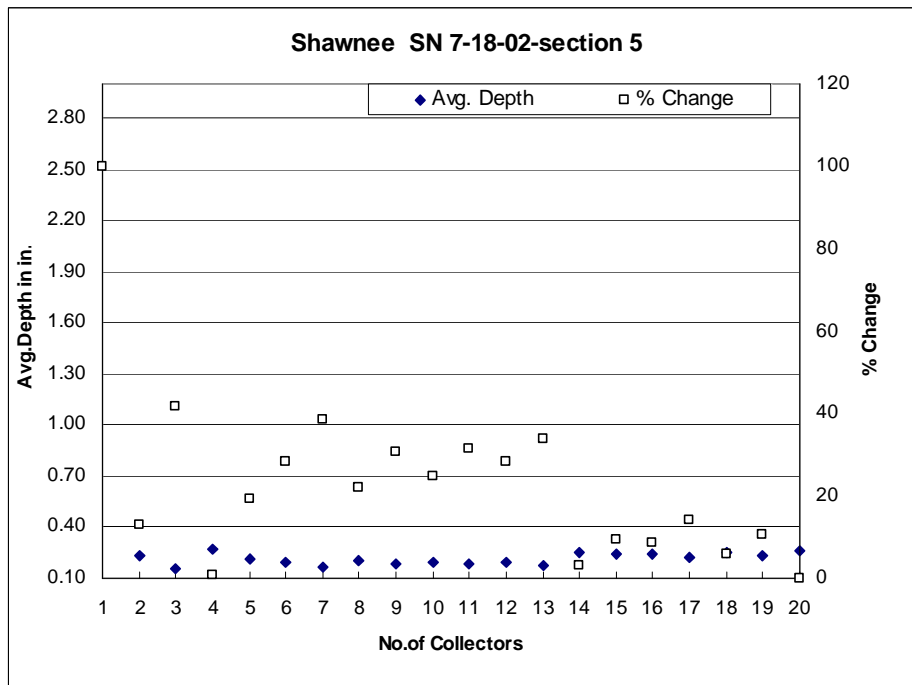
**Figure B.181.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-2 of the Shawnee SN 7-18-02 irrigation system data set.



**Figure B.182.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-3 of the Shawnee SN 7-18-02 irrigation system data set.

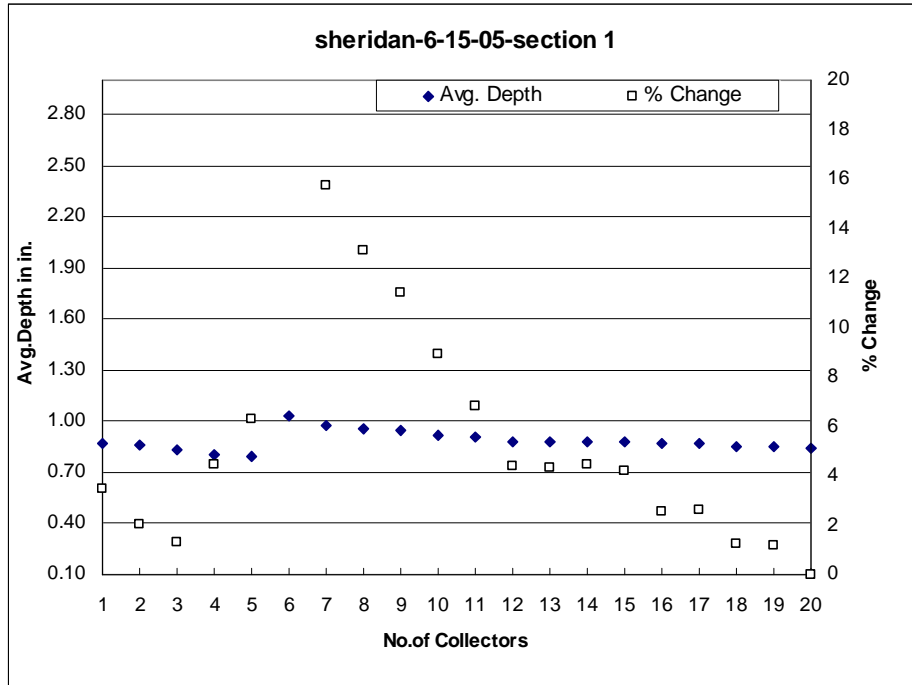


**Figure B.183.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-4 of the Shawnee SN 7-18-02 irrigation system data set.

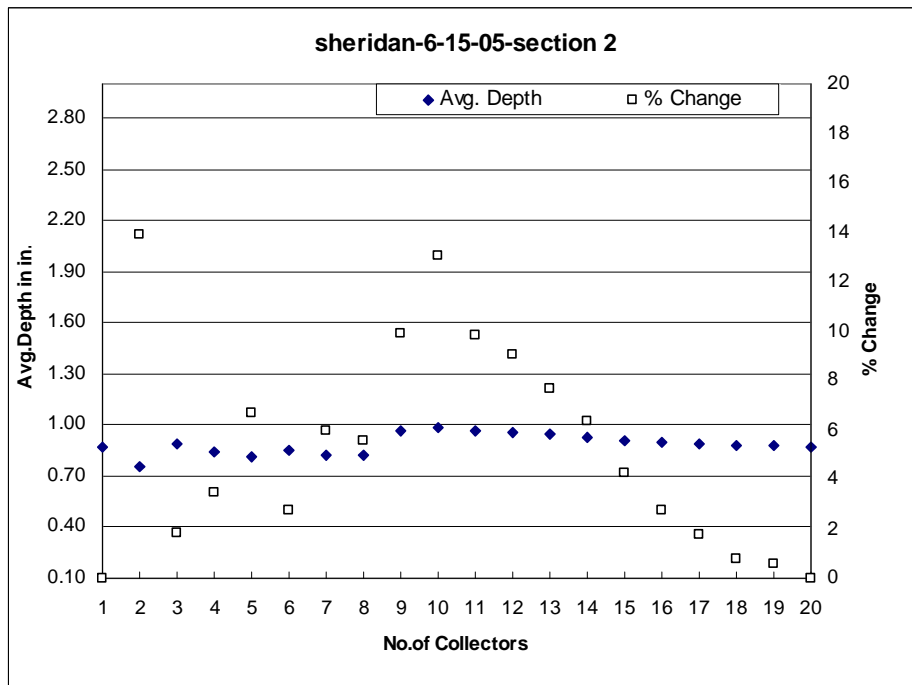


**Figure B.184.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-5 of the Shawnee SN 7-18-02 irrigation system data set.

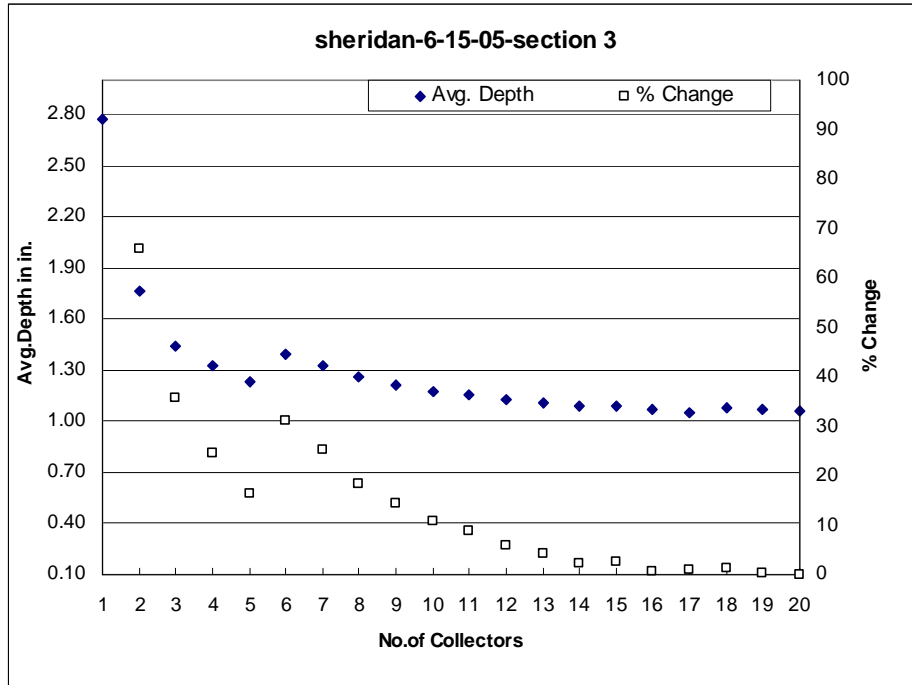




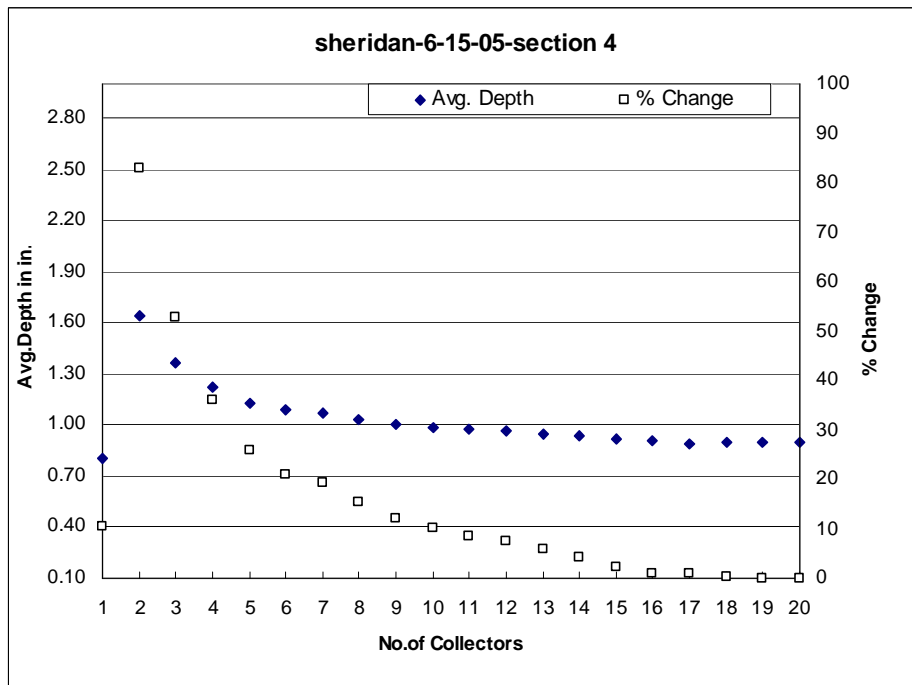
**Figure B.185.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-1 of the Sheridan-6-15-05 irrigation system data set.



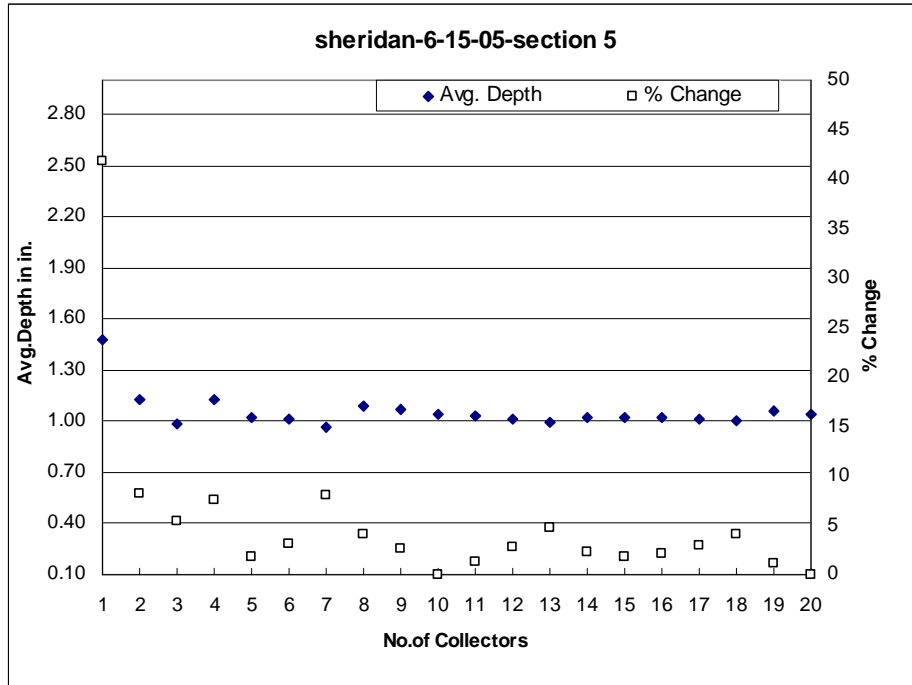
**Figure B.186.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-2 of the Sheridan-6-15-05 irrigation system data set.



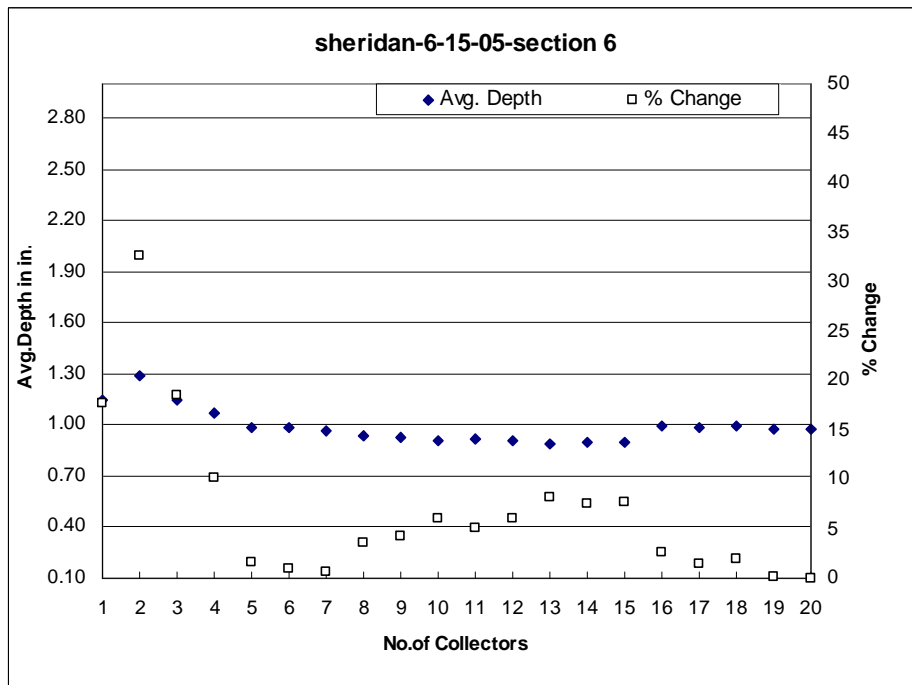
**Figure B.187.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-3 of the Sheridan-6-15-05 irrigation system data set.



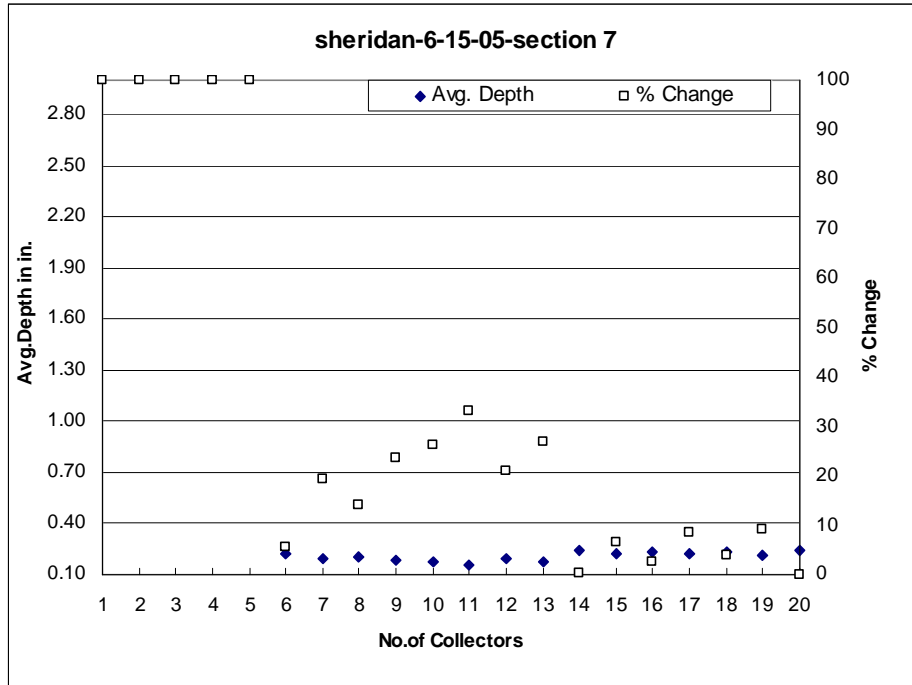
**Figure B.188.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-4 of the Sheridan-6-15-05 irrigation system data set.



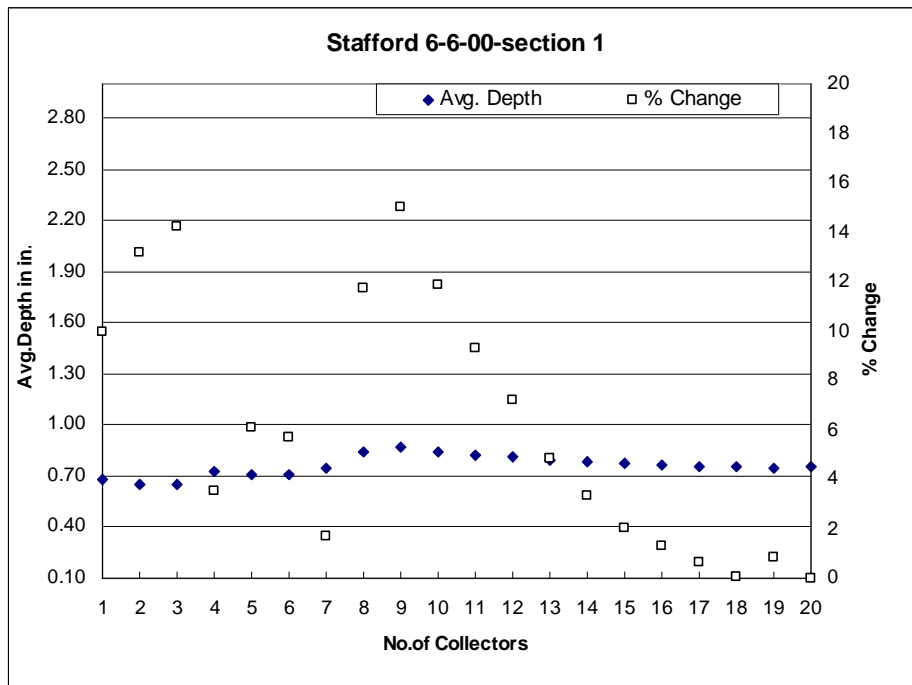
**Figure B.189.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-5 of the Sheridan-6-15-05 irrigation system data set.



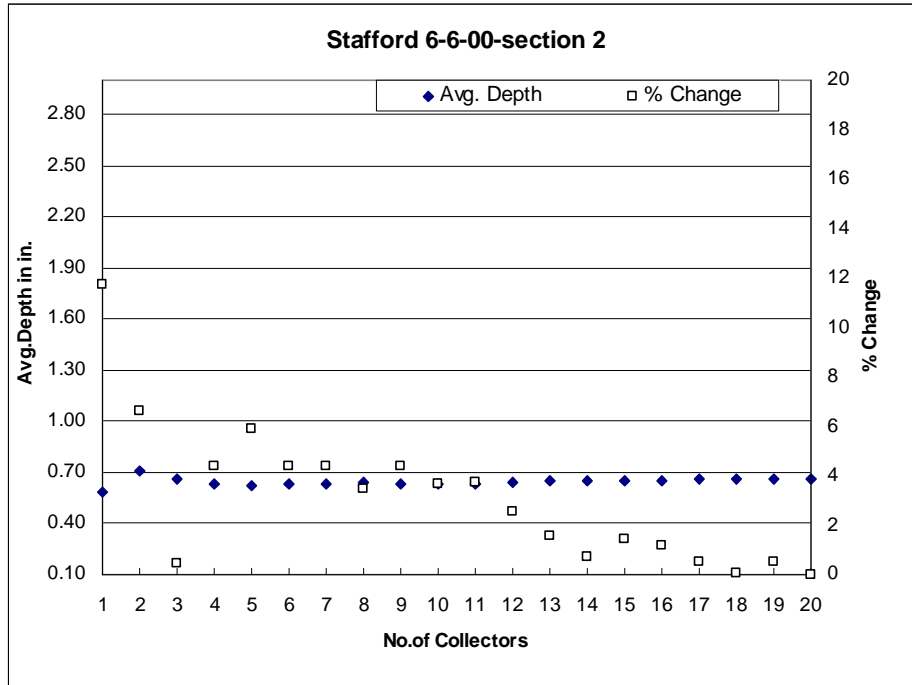
**Figure B.190.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-6 of the Sheridan-6-15-05 irrigation system data set.



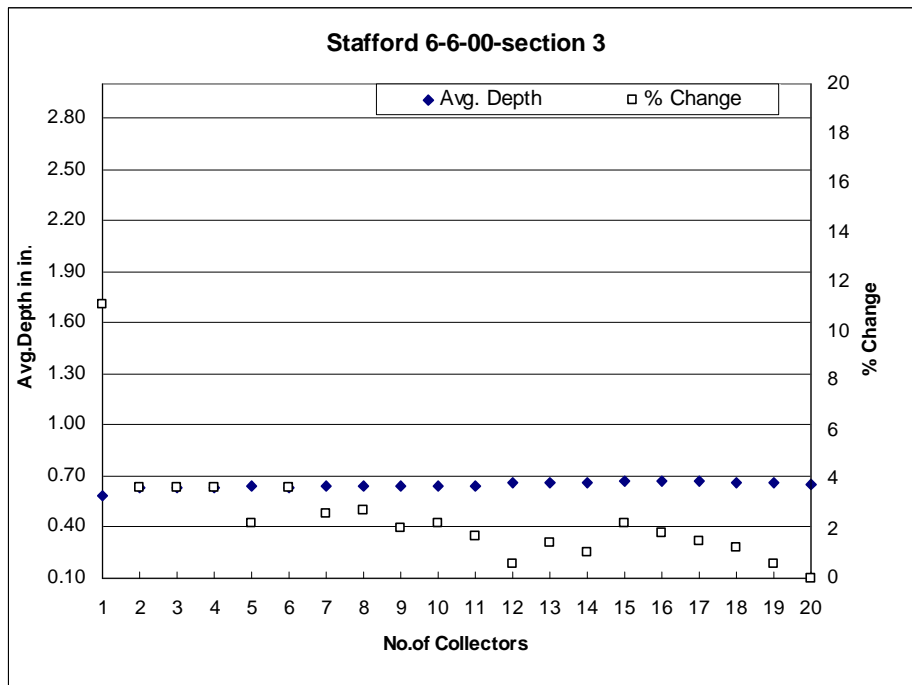
**Figure B.191.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-7 of the Sheridan-6-15-05 irrigation system data set.



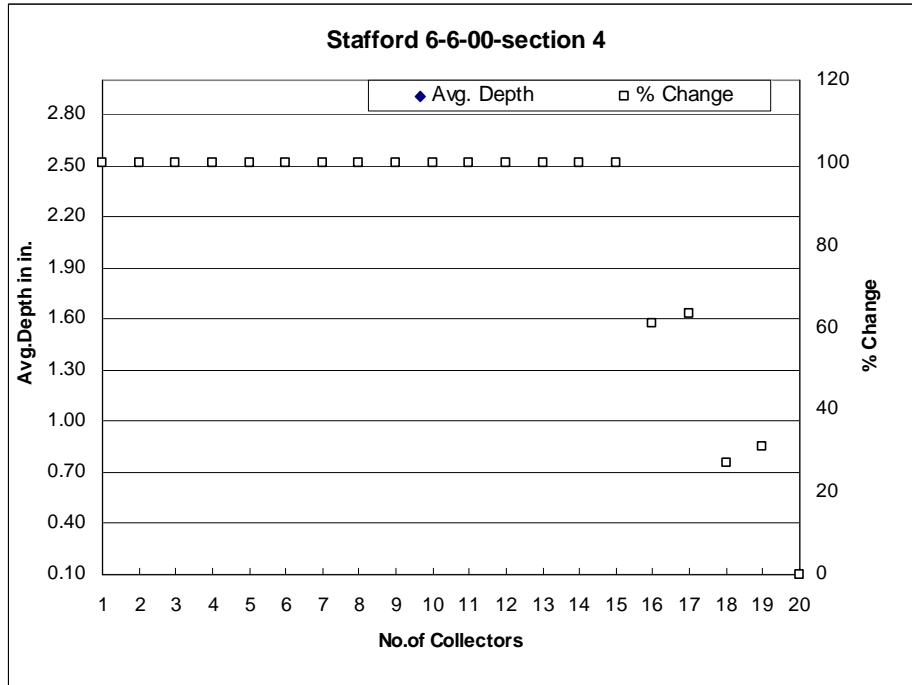
**Figure B.192.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-1 of the Stafford 6-6-00 irrigation system data set.



**Figure B.193.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-2 of the Stafford 6-6-00 irrigation system data set.



**Figure B.194.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-3 of the Stafford 6-6-00 irrigation system data set.



**Figure B.195.** The average depth and associated % change from the base average depth for collector subsets (19, 18, 17, ....1) from the base set of 20 collectors for section-4 of the Stafford 6-6-00 irrigation system data set.