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Part II
Appendixes
B thru D

**CENTRAL AND SOUTHERN
FLORIDA PROJECT**
FOR FLOOD CONTROL AND OTHER PURPOSES
RULE CURVES AND KEY OPERATING CRITERIA
MASTER REGULATION MANUAL



**DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA**

SERIAL NO. 26

Datum Planes in the Caloosahatchee River-Lake Okeechobee
Drainage Areas, Florida

1. The following information is presented in order to explain the reasons for, and clarify the nature and relationships of, the datum planes used by the U. S. Engineer Department as references for elevations in the Caloosahatchee River-Lake Okeechobee Drainage Areas, Florida.

2. In 1884 and 1885, the U. S. Coast and Geodetic Survey observed 96 high waters and 100 low waters in Punta Rasa, and established the relationship that mean low water was 0.86 foot below mean tide level. That datum, known since as "mean low water, Punta Rasa," became the standard datum for waterway elevations along that section of the west coast of Florida. In 1933, the U. S. Coast and Geodetic Survey established mean sea level elevations on the tidal bench marks at Punta Rasa, and determined that "mean low water, Punta Rosa," is 0.88 foot below mean sea level; thus, at Punta Rosa, mean sea level differs from mean tide level by only 0.02 foot.

3. In 1887, a line of levels was run from the Punta Rasa bench marks up the Caloosahatchee River by the U. S. Engineer Department, and a bench mark was established near Lake Hicpochee. The elevation assigned to that bench mark was referred to "mean low water, Punta Rasa." In 1901, a line of levels was run from the 1887 bench mark at Lake Hicpochee up the Kissimmee River. (See Annual Report, 1902, page 1245.) Other surveys in the Lake Okeechobee area were also based on that same bench, and when the Federal project for the Caloosahatchee River-Lake Okeechobee Drainage Areas was adopted, all then-existing elevations in the lake area were referred to what was supposed to be "mean low water, Punta Rasa," as derived directly or indirectly from the 1887 bench mark near Lake Hicpochee. That datum was accordingly adopted for the Federal project, and prescribed in Senate Document No. 115, 71st Congress, 2d Session, the project document.

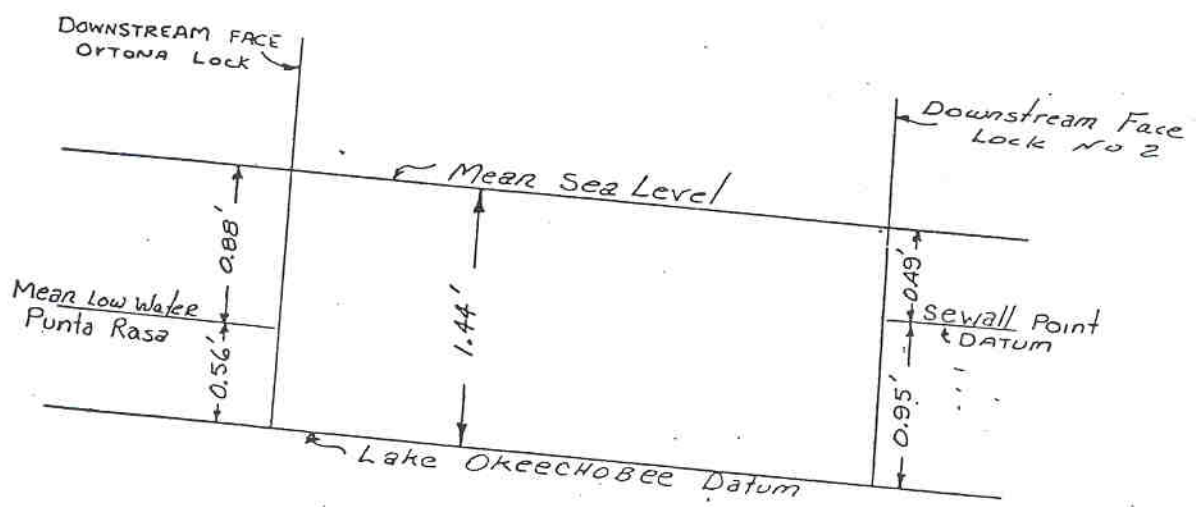
4. During 1933 and 1934, and since, the U. S. Coast and Geodetic Survey ran a network of precise level lines covering peninsular Florida. Check lines run by the U. S. Coast and Geodetic Survey and by the U. S. Engineer Department from the U. S. Coast and Geodetic Survey lines to bench marks previously established have definitely proved that the level lines run up the Caloosahatchee River and Kissimmee valleys in 1887 and 1901 were inaccurate, that the original bench mark near Lake Hicpochee was in error, and that the elevations assigned to bench marks about the lake were not, in fact, referred as supposed to a datum plane 0.88 foot below mean sea level (mean low water, Punta Rasa) but to a plane about 1.44 feet below mean sea level. In order to minimize the work and confusion which would have been entailed by

assigning to all bench marks, structures, lake stages, etc., now, elevations based on the true "mean low water, Punta Rasa datum," it was decided to adhere to the actual datum thereto used (1.44 feet below mean sea level) but to designate it as "Lake Okeechobee datum" instead of "mean low water, Punta Rasa" datum.

5. Nor did the datum plane used for Lake Okeechobee coincide with the datum plane used for the Intracoastal Waterway along the east coast, and an adjustment between them became necessary at some common point. The necessity for such adjustments led to the adoption of the following system of datum planes:

- (a) The Caloosahatchee River from the Gulf of Mexico to the downstream face of the Ortona Lock is referred to "mean low water, Punta Rasa" (0.88 foot below mean sea level as established by the U. S. Coast and Geodetic Survey).
- (b) All waterways between the downstream face of the Ortona Lock and the downstream face of Lock No. 2 (or the new lock when completed) in the St. Lucie Canal are referred to "Lake Okeechobee datum" (1.44 feet below mean sea level as established by the U. S. Coast and Geodetic Survey, and therefore 0.56 foot below "mean low water, Punta Rasa").
- (c) The St. Lucie River and canal from the downstream face of Lock No. 2 (or the new lock when completed) to the Intracoastal Waterway are referred to "Sewall Point" (0.49 foot below mean sea level as established by the U. S. Coast and Geodetic Survey, and therefore 0.95 foot above "Lake Okeechobee datum").

These relationships are shown graphically below:



MIAMI-DADE COUNTY--Continued

WELL NUMBER.--253937080304001. Local Number G 596. USGS Observation Well near Homestead, FL.

LOCATION.--Lat 25°38'16", long 80°30'44". in SW ¼ SW ¼ sec.14, T.55 S., R.38 E., Hydrologic Unit 03090202, on SW 197th Ave., 70 ft north of Howard Drive, 2 mi west of SR-997 (Krome Avenue), and 15.5 mi north of Homestead.

AQUIFER.--Biscayne limestone aquifer of the Pleistocene Age, Geologic Unit 112 BSCNN.

WELL CHARACTERISTICS.--Drilled, observation, water-table well, diameter 6 in., depth 16 ft, cased to 16 ft.

INSTRUMENTATION.--Satellite data collection platform.

DATUM.--Land-surface datum is 7.28 ft above National Geodetic Vertical Datum of 1929. Measuring point: Top of flange, 3.48 ft above land-surface datum. Prior to October 1, 1978, land-surface datum was considered to be 7.70 ft NGVD. See REMARKS. Measuring point was considered to be 10.59 from October 1, 1978 to November 21, 1986. New well was drilled on November 21, 1986.

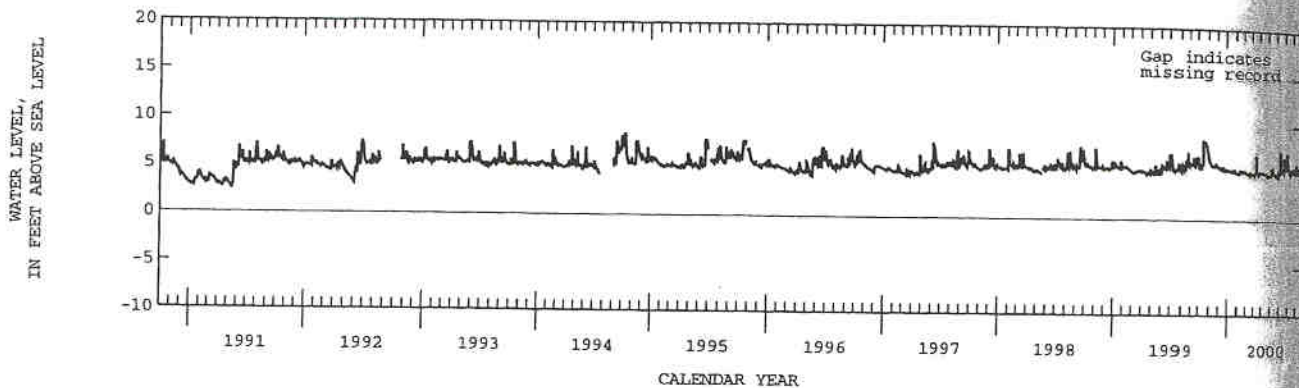
REMARKS.-- The figures of water levels as elevation, in feet NGVD, prior to October 1978 are in error. Corrected records are in files of the Geological Survey. See DATUM. Records of water levels prior to January 1957 are available in files of the Geological Survey.

PERIOD OF RECORD.--January 1949 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest daily maximum water level, 8.37 ft NGVD, Oct. 12, 1994; lowest, 0.56 ft NGVD, May 14, 1971.

ELEVATION (FEET NGVD), WATER YEAR OCTOBER 1999 TO SEPTEMBER 2000
DAILY MAXIMUM VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	5.48	6.08	5.53	5.35	4.93	5.10	4.94	5.12	4.86	5.11	5.79	5.03
10	5.78	5.86	5.66	5.27	5.25	4.98	5.02	5.06	5.34	6.97	5.43	5.77
15	8.26	5.70	5.40	5.16	5.24	4.93	6.19	5.00	5.05	5.20	5.46	5.32
20	8.20	5.67	5.55	5.27	5.23	5.10	5.09	4.90	4.78	5.28	5.30	5.50
25	7.82	5.85	5.43	---	5.22	4.98	5.03	4.68	4.75	6.05	5.06	5.05
EOM	6.54	5.64	5.36	4.99	5.12	4.98	5.17	4.75	4.98	5.45	5.55	5.07
MAX	8.27	6.37	5.66	5.43	5.26	5.10	6.86	5.14	5.50	7.31	7.20	6.05



WELL NUMBER.--
LOCATION.--
SW 105th
AQUIFER.--
WELL CHARACTERISTICS.--
INSTRUMENTATION.--
DATUM.--
REMARKS.--
PERIOD OF RECORD.--
EXTREMES FOR PERIOD OF RECORD.--

DAY
1
1
2
2
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WATER LEVEL,
IN FEET ABOVE SEA LEVEL

PEACE, WITHLACOOCHEE, HILLSBOROUGH RIVER AND WESTERN COASTAL AREA

WITHLACOOCHEE RIVER BASIN

02313000 WITHLACOOCHEE RIVER NEAR HOLDER, FL

LOCATION.--Lat 28°59'19", long 82°20'59", in NW¼ sec.30, T.17 S., R.20 E., Marion County, Hydrologic Unit 03100208, near right bank on downstream side of bridge on State Highway 200, 4.5 mi (7.2 km) northeast of Holder, and 38 mi (61 km) upstream from mouth.

DRAINAGE AREA.--1,825 mi² (4,730 km²), approximately.

PERIOD OF RECORD.--August 1928 to February 1929, August 1931 to current year.

REVISED RECORDS.--WDR-FL-72-3: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 27.52 ft (8.388 m) National Geodetic Vertical Datum of 1929 (levels by Corps of Engineers). Aug. 14, 1928, to Feb. 15, 1929, nonrecording gage at present site at datum 2.00 ft (0.610 m) higher. Aug. 29, 1931, to May 19, 1961, water-stage recorder at site 100 ft (30 m) downstream at present datum.

REMARKS.--Records good.

AVERAGE DISCHARGE.--51 years (water years 1932-82), 1,080 ft³/s (30.59 m³/s), 8.04 in/yr (204 mm/yr), 782,500 acre-ft/yr (965 hm³/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,660 ft³/s (245 m³/s) Apr. 5, 1960, gage height, 13.28 ft (4.048 m); minimum, 112 ft³/s (3.17 m³/s) June 18, 1956; minimum gage height, -0.41 ft (-0.125 m) June 19, 1945.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,390 ft³/s (96.0 m³/s) Sept. 28, gage height, 8.48 ft (2.585 m), occurred on peak preceding higher peak of Oct. 7, 1982; maximum independent peak discharge, 2,640 ft³/s (74.8 m³/s) June 27, gage height, 7.28 ft (2.219 m); minimum discharge, 173 ft³ (4.90 m³/s) Oct. 20-22; minimum gage height, 0.77 ft (0.235 m) Oct. 20, 21.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	235	200	193	260	429	616	1380	924	695	2430	2320	2450
2	237	203	209	257	431	610	1360	904	689	2360	2300	2410
3	226	201	215	258	446	610	1340	877	777	2310	2300	2370
4	216	201	206	264	478	610	1310	849	754	2250	2290	2330
5	213	222	198	264	487	619	1270	822	723	2250	2260	2290
6	210	237	194	261	488	752	1240	798	690	2250	2230	2270
7	209	223	196	263	478	955	1180	772	662	2330	2210	2300
8	206	209	197	262	470	1060	1110	751	639	2390	2190	2320
9	209	202	196	264	472	1130	1070	733	621	2390	2210	2430
10	215	203	195	264	487	1200	1050	710	606	2430	2240	2710
11	210	212	191	266	477	1250	1210	694	593	2440	2080	2810
12	205	215	187	274	491	1280	1210	686	583	2440	2000	2790
13	197	210	189	295	528	1300	1190	649	563	2450	2040	2780
14	189	204	188	404	531	1300	1170	614	538	2400	2040	2760
15	190	198	197	438	529	1290	1150	584	518	2360	2080	2760
16	190	198	190	412	613	1270	1130	556	514	2320	2090	2740
17	187	204	187	393	680	1250	1110	531	540	2330	2090	2720
18	191	200	189	380	696	1220	1090	519	1170	2320	2130	2700
19	188	196	190	375	687	1210	1060	498	1320	2300	2240	2670
20	177	197	189	375	674	1200	1050	473	1380	2320	2360	2670
21	175	194	191	391	662	1180	1030	450	1470	2380	2400	2700
22	176	192	193	399	649	1170	1010	432	1580	2480	2410	2990
23	182	188	196	403	639	1160	980	445	1860	2510	2410	2990
24	205	194	195	408	639	1160	974	449	2270	2490	2400	2960
25	277	195	194	405	636	1190	1030	443	2450	2490	2380	3040
26	258	196	196	403	627	1230	1030	468	2550	2510	2370	3180
27	256	201	246	400	625	1210	1020	525	2620	2480	2410	3330
28	238	201	275	404	624	1230	1000	522	2610	2460	2470	3380
29	220	198	266	412	---	1340	971	504	2550	2450	2490	3360
30	210	196	252	417	---	1370	945	511	2490	2400	2500	3350
31	199	---	249	426	---	1390	---	718	---	2360	2480	---
TOTAL	6496	6090	6349	10697	15673	34362	33670	19411	37025	74080	70420	82560
MEAN	210	203	205	345	560	1108	1122	626	1234	2390	2272	2752
MAX	277	237	275	438	696	1390	1380	924	2620	2510	2500	3380
MIN	175	188	187	257	429	610	945	432	514	2250	2000	2270
CFSM	.12	.11	.11	.19	.31	.61	.62	.34	.68	1.31	1.25	1.51
IN.	.13	.12	.13	.22	.32	.70	.69	.40	.75	1.51	1.44	1.68
AC-FT	12880	12080	12590	21220	31090	68160	66780	38500	73440	146900	139700	163800

CAL YR 1981 TOTAL 100658 MEAN 276 MAX 663 MIN 125 CFSM .15 IN 2.05 AC-FT 199700
WTR YR 1982 TOTAL 396833 MEAN 1087 MAX 3380 MIN 175 CFSM .60 IN 8.09 AC-FT 787100

LAKE OKEECHOBEE

02276400 LAKE OKEECHOBEE, FL

LOCATION.--Center of lake, lat 26°57', long 80°50', in southern Florida, Hydrologic Unit 03090201.

SURFACE AREA.--436,000 acres (681 mi²) at elevation 14 ft above National Geodetic Vertical Datum, from data provided by U.S. Army Corps of Engineers.

DRAINAGE AREA.--About 5,650 mi².

PERIOD OF RECORD.--October 1931 to current year. Records of elevations prior to October 1960 are available as follows: from 1912 to 1914 in reports or files of U.S. Army Corps of Engineers, 1915 to September 1931 in reports or files of Everglades Drainage District, and October 1931 to 1960 in files of the Orlando Subdistrict Office.

REVISED RECORDS.--WRD FL 1969: Surface area. WDR FL-77-1: capacity table.

GAGE.--Three water-stage recorders at Hurricane Gate No. 2, Hurricane Gate No. 6 and Port Mayaca. Datum of gages is National Geodetic Vertical Datum of 1929 (levels by U.S. Army Corps of Engineers). Prior to Oct. 1, 1941, nonrecording gage at St. Lucie Canal. Oct. 1, 1941, to Dec. 31, 1950, seven nonrecording gages at various locations on rim of lake. Prior to Oct. 1, 1933, at datum 1.01 ft lower. Oct. 1, 1933, to Sept. 30, 1946, at datum 1.44 ft lower.

REMARKS.--Lake is diked to form a reservoir and is regulated by control structure gates at several outlets. It is used for navigation, municipal water supply, irrigation, and flood control. Total usable capacity is 2,860,000 acre-ft between elevations 10.5 and 17.5 ft.

COOPERATION.--Records of elevations and capacity table furnished by U.S. Army Corps of Engineers.

EXTREMES FOR PERIOD OF RECORD.--Maximum elevation observed, 18.77 ft, Nov. 2, 1947; minimum daily, 9.79 ft, July 30,31, Aug. 1, 1981.

EXTREMES FOR CURRENT YEAR.--Maximum daily elevation, 16.25 ft, Oct. 1, occurred on recession following crest of Sept. 30, 1984; minimum daily, 11.82 ft, June 12,21.

Capacity table, water year 1983-85 (elevation, in feet, and capacity, in acre-feet)

10.0	2,040,000	15.0	3,950,000
11.0	2,370,000	16.0	4,380,000
12.0	2,720,000	17.0	4,830,000
13.0	3,110,000	18.0	5,290,000
14.0	3,530,000		

ELEVATION, IN FEET NGVD, WATER YEAR OCTOBER 1984 TO SEPTEMBER 1985
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16.25	15.74	15.50	15.14	14.77	14.01	13.41	13.05	12.32	11.98	12.19	12.53
2	16.24	15.75	15.51	15.24	14.77	13.98	13.38	13.04	12.28	11.99	12.15	12.70
3	16.24	15.75	15.52	15.31	14.76	13.95	13.35	13.02	12.24	12.00	12.13	12.86
4	16.23	15.75	15.53	15.34	14.75	13.91	13.33	13.00	12.19	12.00	12.12	13.00
5	16.22	15.74	15.54	15.32	14.72	13.87	13.31	12.98	12.12	12.00	12.13	13.12
6	16.21	15.71	15.53	15.26	14.67	13.83	13.29	12.96	12.06	11.98	12.17	13.21
7	16.20	15.68	15.52	15.21	14.60	13.79	13.27	12.93	12.01	11.97	12.25	13.27
8	16.19	15.64	15.49	15.18	14.53	13.76	13.25	12.90	11.97	11.97	12.35	13.31
9	16.17	15.59	15.45	15.17	14.47	13.73	13.22	12.87	11.93	11.97	12.46	13.32
10	16.15	15.55	15.42	15.16	14.41	13.70	13.18	12.84	11.88	11.98	12.56	13.32
11	16.14	15.52	15.40	15.13	14.37	13.67	13.15	12.81	11.84	11.98	12.65	13.29
12	16.12	15.49	15.40	15.10	14.35	13.63	13.14	12.78	11.82	11.97	12.70	13.26
13	16.10	15.46	15.39	15.06	14.33	13.61	13.16	12.76	11.84	11.97	12.72	13.24
14	16.08	15.44	15.38	15.03	14.31	13.61	13.21	12.73	11.87	11.97	12.73	13.24
15	16.06	15.41	15.37	15.00	14.30	13.61	13.26	12.70	11.91	11.97	12.72	13.27
16	16.04	15.38	15.35	14.99	14.28	13.60	13.29	12.66	11.93	11.98	12.72	13.35
17	16.02	15.35	15.34	15.00	14.26	13.58	13.31	12.62	11.94	12.00	12.71	13.46
18	16.01	15.33	15.32	15.01	14.24	13.55	13.32	12.57	11.93	12.01	12.72	13.58
19	15.99	15.32	15.31	15.01	14.22	13.53	13.32	12.53	11.89	12.02	12.72	13.70
20	15.97	15.32	15.30	14.98	14.20	13.55	13.30	12.49	11.85	12.01	12.73	13.81
21	15.95	15.35	15.29	14.94	14.18	13.59	13.28	12.48	11.82	12.00	12.73	13.89
22	15.93	15.39	15.28	14.90	14.16	13.62	13.26	12.48	11.83	12.00	12.73	13.95
23	15.91	15.44	15.27	14.87	14.14	13.62	13.23	12.49	11.85	12.04	12.73	13.99
24	15.89	15.49	15.26	14.86	14.12	13.60	13.20	12.51	11.88	12.08	12.72	14.01
25	15.87	15.53	15.25	14.86	14.10	13.58	13.18	12.52	11.90	12.13	12.71	14.03
26	15.85	15.55	15.23	14.84	14.08	13.56	13.15	12.53	11.91	12.16	12.69	14.04
27	15.83	15.55	15.21	14.83	14.07	13.54	13.13	12.51	11.93	12.17	12.68	14.06
28	15.82	15.54	15.20	14.81	14.05	13.52	13.10	12.49	11.94	12.18	12.66	14.07
29	15.80	15.53	15.19	14.79	---	13.50	13.07	12.45	11.96	12.18	12.63	14.08
30	15.79	15.51	15.18	14.78	---	13.48	13.04	12.40	11.97	12.19	12.61	14.09
31	15.77	---	15.17	14.76	---	13.45	---	12.35	---	12.19	12.59	---
MEAN	16.03	15.53	15.36	15.03	14.36	13.66	13.24	12.69	11.96	12.03	12.55	13.50
MAX	16.25	15.75	15.54	15.34	14.77	14.01	13.41	13.05	12.32	12.19	12.73	14.09
MIN	15.77	15.32	15.17	14.76	14.05	13.45	13.04	12.35	11.82	11.97	12.12	12.53
CAL YR 1984	MEAN	16.01	MAX	16.77	MIN	15.17						
WTR YR 1985	MEAN	13.83	MAX	16.25	MIN	11.82						