# Application of the Lake Okeechobee Regulation Schedule (LORS2008) on 8/1/2016 (ENSO Neutral Condition)

### Lake Okeechobee Net Inflow Outlook:

The Lake Okeechobee Net Inflow Outlook has been computed using 4 methods: Croley's method<sup>1</sup>, the SFWMD empirical method<sup>2</sup>, a sub-sampling of Neutral years<sup>3</sup> and a sub-sampling of warm years of the Atlantic Multi-decadal Oscillation (AMO) in combination with Neutral ENSO years<sup>4</sup>. The results for Croley's method and the SFWMD empirical method are based on the <u>CPC Outlook</u>.

Table of the Lake Okeechobee Net Inflow Outlooks in feet of equivalent depth. All methods are updated on a weekly basis with observed net inflow for the current month.

Season	Cı Me	roley's ethod <sup>1*</sup>	SFWMD Empirical Method2Sub-sampling of Neutral ENSO Years3Sub- AM Neu		SFWMD Empirical Method2Sub-sampling of Neutral ENSO Years3Sub-sampling AMO Warm Neutral ENSO Years4		ampling of Warm + al ENSO ears <sup>4</sup>	
	Value (ft)	<u>Condition</u>	Value (ft)	Condition	Value (ft)	Condition	Value (ft)	Condition
Current (Aug- Jan)	N/A	N/A	1.89	Wet	2.61	Very Wet	3.15	Very Wet
Multi Seasonal (Aug- Apr)	N/A	N/A	1.98	Normal	2.64	Wet	3.23	Wet

\*Croley's Method Not Produced For This Report

See <u>Seasonal</u> and <u>Multi-Seasonal</u> tables for the classification of Lake Okeechobee Outlooks.

The recommended methods and values for estimating the Lake Okeechobee Net Inflow Outlook are shaded and should be used in the LORS2008 Release Guidance Flow Charts.

#### Tributary Hydrologic Conditions Graph:

**1753 cfs** 14-day running average for Lake Okeechobee Net Inflow through 8/1/2016. According to the classification in <u>Tributary Hydrologic Conditions</u> table, this condition is Normal.

**-0.76** for Palmer Index on 7/30/2016.

According to the classification in <u>Tributary Hydrologic Conditions</u> table, this condition is Normal.

The wetter of the two conditions above is **Normal**.

### LORS2008 Classification Tables:

### Lake Okeechobee Stage on 8/1/2016

Lake Okeechobee Stage: 14.63 feet

USACE Report for Lake Okeechobee

Lake Okeechobee Stage Hydrograph

Lake Okeechob Zone/	ee Management 'Band	Bottom Elevation (feet, NGVD)	Current Lake Stage
High Lake Manage	ement Band	16.29	
Operational Band	High sub-band	15.86	
	Intermediate sub-band	15.43	
	Low sub-band	13.57	← 14.63
Base Flow sub-ba	nd	12.60	
Beneficial Use sub	o-band	11.75	
Water Shortage M	lanagement Band		

#### Part C of LORS2008: Discharge to WCA's

Release Guidance Flow Chart Outcome: Up to Maximum Releases to the WCAs if Desirable or with Minimum Everglades Impacts

### Part D of LORS2008: Discharge to Tidewater

Release Guidance Flow Chart Outcome: S-79 up to 3000 cfs and S-80 up to 1170 cfs

### **Technical Input Summaries from:**

- Lake Okeechobee Division
- Coastal Ecosystems
- Everglades Ecosystems Division
- Water Supply Department
- Water Resource Management Release Recommendation
- Kissimmee Watershed Environmental Conditions
- Operations Department

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### LORS2008 Implementation on 8/1/2016 (ENSO Neutral Condition):

#### Status for week ending 8/1/2016:

District wide, Raindar rainfall was 0.95 inches for the week. Lake stage on 8/1/2016 was 14.63 ft, down 0.05 ft from last week.

The updated July 2016 SFWMM Dynamic Position Analysis <u>percentile graph</u> for Lake Okeechobee show that the current lake stage is in the Low Operational Sub-Band.

The LORS2008 tributary <u>indices</u> are classified as **Normal**. The PDSI indicates normal condition and the LONIN is Normal. The classification is based on the wetter of the two.

#### Water Supply Risk Evaluation

Area	Indicator	Value	Color Coded Scoring Scheme
	Projected LOK Stage for the next two months	Low Sub-Band	L
LOK	Palmer Index for LOK Tributary Conditions	-0.76 (Normal)	L
	CPC Procinitation Outlook	1 month: Normal	L
	CPC Precipitation Outlook	3 months: Above Normal	L
	LOK Seasonal Net Inflow Forecast ENSO Neutral Years	2.61 ft (Normal to Extremely Wet)	L
	LOK Multi-Seasonal Net Inflow Forecast ENSO Neutral Years	2.64 ft (Normal)	М
	WCA 1: Site 1-7, Site 1-8T, & Site 1-9 Average	Above Line 1 (15.72 ft)	L
WCAs	WCA 2A: Site 2-17 HW	Above Line1 (11.95 ft)	L
	WCA-3A: 3 Station Average (Site 63, 64 and 65)	Above Line 1 (9.79 ft)	L
	Service Area 1	Year-Round Irrigation Rule in effect	L
LEC	Service Area 2	Year-Round Irrigation Rule in effect	L
	Service Area 3	Year-Round Irrigation Rule in effect	L

Note: The water supply risk classification based on the Palmer index, as well as the LOK seasonal and multi-seasonal net inflow forecasts use slightly different classification intervals than those used by the 2008-LORS.

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# Lake Okeechobee SFWMM July 2016 Position Analysis



(See assumptions on the Position Analysis Results website)

### Tributary Basin Condition Indicators as of August 1 2016

Palmer Index



Mon Aug 01 11:51:57 EDT 2016

Flow (cfs)

## 2008 LORS

### Part C: Establish Allowable Lake Okeechobee Releases to the Water Conservation Areas



### 2008 LORS

### Part D: Establish Allowable Lake Okeechobee Releases to Tide (Estuaries)



### Lake Okeechobee Water Level History and Projected Stages



Adopted by USACE 28-April-2008

Projected Stage Percentiles From SFWMD-HESM Position Analysis

U. S. Army Corps of Engineers, Jacksonville District Lake Okeechobee and Vicinity Report \*\* Preliminary Data - Subject to Revision \*\* Data Ending 2400 hours 31 JUL 2016 Okeechobee Lake Regulation Elevation Last Year 2YRS Ago (ft-NGVD) (ft-NGVD) (ft-NGVD) \*Okeechobee Lake Elevation 14.63 12.18 13.94 (Official Elv) Bottom of High Lake Mngmt= 16.28 Top of Water Short Mngmt= 11.74 Currently in Operational Management Band Simulated Average LORS2008 [1965-2000] 12.70 Difference from Average LORS2008 1.93 31JUL (1965-2007) Period of Record Average 13.77 Difference from POR Average 0.86 Today Lake Okeechobee elevation is determined from the 4 Int & 4 Edge stations ++Navigation Depth (Based on 2007 Channel Condition Survey) Route 1 ÷ 8.57' ++Navigation Depth (Based on 2008 Channel Condition Survey) Route 2 ÷ 6.77' Bridge Clearance = 49.15' 4 Interior and 4 Edge Okeechobee Lake Average (Avg-Daily values): L001 L005 L006 LZ40 S4 S352 S308 S133 14.52 14.69 14.63 14.63 14.62 14.76 14.59 14.60 \*Combination Okeechobee Avg-Daily Lake Average = 14.63 (\*See Note) Okeechobee Inflows (cfs): Fisheating Cr S65E 1014 C5 -108 615 S191 S154 0 0 S135 Pumps 0 0 S84 478 S133 Pumps S2 Pumps 0 0 816 S84X S127 Pumps S3 Pumps 0 0 0 S71 0 S129 Pumps S4 Pumps 30 0 S72 S131 Pumps Total Inflows: 2845 Okeechobee Outflows (cfs): S135 Culverts -NR- S354 1105 S77 (Not Used) S127 Culverts 0 S351 714 S77Below 1192 (USED) S129 Culverts 0 S352 452 S308 (Not Used)

S131 Culverts 0 L8 Canal Pt 304 S308Below 1309 (USED) Total Outflows: 5076 \*\*\*\*S77 Structure outflow is being used to compute Total Outflow. \*\*\*\*S308 Structure outflow is being used to compute Total Outflow. Okeechobee Pan Evaporation (inches): S77 0.31 S308 0.21 Average Pan Evap x 0.75 Pan Coefficient = 0.19" = 0.02' Lake Average Precipitation using NEXRAD: = 0.54" = 0.05' Evaporation - Precipitation: = -0.35" = -0.03'Evaporation - Precipitation using Lake Area of 730 square miles is equal to 6772 cfs into the lake. Lake Okeechobee (Change in Storage) Flow is -4235 cfs or -8400 AC-FT

Note: Headwater, tailwater, and stage values below are instantaneous values unless otherwise specified.

	Headwater	Tailwater				Gat	te Pos	sitior	18	
	Elevation	Elevation	Disch	#1	#2	#3	#4	#5	#6 #7	7
#8				( 5 . )	( 5 . )	( 5 . )	( )	( 5 . )	(	
(f+)	(it-msl)	(it-msl)	(cis)	(1t)	(it)	(1t)	(Íť)	(Íť)	(ít) (ít	2)
(10)		( ]	I) see r	note at	bott	tom				
North East Sl	hore	с <u>-</u>	,							
S133 Pumps S193:	: 13.55	14.82	0	0	0	0	0	0	(cfs)	
S191:	18.30	14.91	0	0.0	0.0	0.0				
S135 Pumps	:	-NR-	0	0	0	0	0		(cfs)	
S135 Culve:	rts:		-NR-	-NR-	-NR-					
North West Sl	hore									
S65E:	21.06	15.30	1014	0.0	0.5	0.6	0.6	0.6	0.2	
S127 Pumps	: 13.60	14.72	0	0	0	0	0	0	(cfs)	
S127 Culve:	rt:		0	0.0						
S129 Pumps	: 13.19	14.73	0	0	0	0			(cfs)	
S129 Culve:	rt:		0	0.0						
S131 Pumps	: 12.85	14.64	0	0	0				(cfs)	
S131 Culve:	rt:		0							
Fisheating	Creek									
nr Palmda nr Lakepo	ale ort	32.31	615							
C5:	14.85	14.70 -	-108	5.3 5	5.2 5	5.2				

South Shore								
S4 Pumps:	11.16	14.56	0	0	0	0		(cfs)
S169:	14.50	11.16	0	0.0	0.0	0.0		
S310:	14.45		30					
S3 Pumps:	10.84	14.68	0	0	0	0		(cfs)
S354:	14.68	10.84	1105	1.8	2.0			
S2 Pumps:	10.41	14.71	0	0	0	0	0	(cfs)
S351:	14.71	10.41	714	0.2	0.2	0.2		
S352:	14.76	10.52	452	0.6	0.6			
C10A:	-NR-	14.66		0.0	0.0	8.0	0.0	0.0
L8 Canal PT		14.49	304					

	S351	and \$352	2 Tempora	ary Pum	ips/S3	54 Sp	illwa	ıy		
S351: S352: S354:	10.41 10.52 10.84	14.71 14.76 14.68	714 452 1105	-NRN -NRN -NRN	IR – – NR IR – – NR IR – – NR	NR- NR- NR-	-NR	NR-		
Caloosaha	tchee River (S	577, S78,	S79)							
S47B: S47D: S77:	14.36 11.14	11.10 11.13	36	0.0 6.0	0.0					
Spill Flow	way and Sector 14.73 Due to Lockage	Flow: 11.21 s+:	1192 2	0.0	3.0	0.0	0.0			
S77 Bel	ow USGS Flow G	lage	1192							
S78: Spill Flow	way and Sector 11.21 Due to Lockage	Flow: 3.30 es+:	1346 3	0.0	0.0	2.5	0.0			
S79: Spill	way and Sector 3.31	Flow: 1.02	3929	2.0	2.0	2.0	2.0	2.0	2.0	1.0
Flow Perce Chlor	Due to Lockage nt of flow fro ide	es+: om S77 (ppm)	4 28% 40							
St. Lucie S308:	Canal (S308,	S80)								
Spill Flow	way and Sector 14.63 Due to Lockage	Flow: 14.35 es+:	1309 0	3.0 2	.5 2	.5 3	.0			
S308 Be S153: S80:	low USGS Flow 18.62	Gage 14.19	1309 59	0.0	0.0					
Spill Flow Perce	way and Sector 14.30 Due to Lockage nt of flow fro	Flow: 0.97 es+: om S308	1094 22 144%	0.3	0.4	0.4	0.0	0.4	0.4	0.0

Steele	Point	Top Salinity	(mg/ml)	* * * *
Steele	Point	Bottom Salinity	(mg/ml)	* * * *
			, <u>,</u>	
Speedy	Point	Top Salinity	(mg/ml)	* * * *

+ Flow Due to lockages is computed utilizing average daily headwater and tailwater along with total number of lockages for the day to calculate a volume which is then converted to an average discharge in cfs.

_				Wi	.nd
- Daily Precipitation Totals Speed	1-Day	3-Day	7-Day	Directio	n
bpeed	(inches)	(inches)	(inches)	(Dega)	
(mph)	(Inched)	(Inched)	( meneb)	(Dego)	
S133 Pump Station:	-NR-	0.00	0.00		
S193:	-NR -	0.00	0.00	-NR-	–NR–
Okeechobee Field Station:	-NR -	0.00	0.00		
S135 Pump Station:	-NR -	0.00	0.00		
S127 Pump Station:	-NR -	0.00	0.00		
S129 Pump Station:	-NR-	0.00	0.00		
S131 Pump Station:	-NR -	0.00	0.00		
S77:	0.00	0.03	1.22	12	0
S78:	1.13	1.13	1.49	322	2
S79:	0.00	0.00	0.00	136	1
S4 Pump Station:	-NR-	0.00	0.00		_
Clewiston Field Station:	-NR -	0.00	0.00		
S3 Pump Station:	-NR -	0.00	0.00		
S2 Pump Station:	-NR -	0.00	0.00		
S308:	* * * * * * *	*****	******	51	2
S80:	0.04	0.04	1.00	0	0
Okeechobee Average	******	5058.00	******	Ū	•
(Sites S78, S79 and	S80 not i	ncluded)			
Oke Nexrad Basin Avg	0.54	0.64	1.53		

Okeechobee Lake Elevations 31 JUL 2016 14.63 Difference from 31JUL16 31JUL16 -1 Day = 30 JUL 2016 14.65 0.02 31JUL16 -2 Days = 29 JUL 2016 14.69 0.06 31JUL16 -3 Days = 28 JUL 2016 14.70 0.07 27 JUL 2016 31JUL16 -4 Days = 14.71 0.08 26 JUL 2016 31JUL16 -5 Days = 14.72 0.09 31JUL16 -6 Days = 25 JUL 2016 14.69 0.06 31JUL16 -7 Days = 24 JUL 2016 0.05 14.68 01 JUL 2016 31JUL16 -30 Days = 14.94 0.31 31JUL16 -1 Year = 31 JUL 2015 12.18 -2.45 31JUL16 -2 Year = 31 JUL 2014 13.94 -0.69

Lake Okeechobee Net Inflow (LONIN) Average Flow over the previous 14 days Avg-Daily Flow Today = 31 JUL 2016 1758 MON 31JUL16 753 31JUL16-1Day=30JUL20162178SUN31JUL16-2Days=29JUL20162522SAT31JUL16-3Days=28JUL20162505FRI31JUL16-4Days=27JUL20162702THU31JUL16-5Days=26JUL20162776WED31JUL16-6Days=25JUL20161854TUE31JUL16-7Days=23JUL2016695SUN31JUL16-9Days=22JUL2016683SAT31JUL16-10Days=21JUL2016188FRI31JUL16-11Days=20JUL2016-218THU31JUL16-12Days=19JUL2016-194WED31JUL16-13Days=18JUL201625TUE 31JUL16 -1 Day = 30 JUL 2016 2178 SUN -2292 2263 627 -181 8290 4089 4802 -853 6756 4227 645 -1538 -2976 S65E Average Flow over previous 14 days Avg-Daily Flow 31 JUL 2016 1323 MON Today= 31JUL16 1155 31JUL16 -1 Day = 30 JUL 2016 1340 SUN 1208 29 JUL 2016 31JUL16 -2 Days = 1348 SAT 1288 

 31JUL16
 -3 Days
 =
 28 JUL 2016

 31JUL16
 -4 Days
 =
 27 JUL 2016

 31JUL16
 -5 Days
 =
 26 JUL 2016

 31JUL16
 -6 Days
 =
 25 JUL 2016

 31JUL16
 -7 Days
 =
 24 JUL 2016

 31JUL16
 -8 Days
 =
 23 JUL 2016

 31JUL16
 -9 Days
 =
 22 JUL 2016

 31JUL16
 -10 Days
 =
 21 JUL 2016

 31JUL16
 -10 Days
 =
 20 JUL 2016

 31JUL16
 -11 Days
 =
 20 JUL 2016

 31JUL16
 -12 Days
 =
 19 JUL 2016

 31JUL16
 -13 Days
 =
 18 JUL 2016

 28 JUL 2016 1346 FRI 31JUL16 -3 Days = 1365 1353 FRI 1353 THU 1344 WED 1329 TUE 1310 MON 1317 SUN 1322 SAT 1396 1352 1428 1200 1467 1453 1336 FRI 1160 1400 THU 1357 1452 WED 1307 1538 TUE 1383

Lake Okeechobee Outlets Last 14 Days

			S-77	Below S-77	S-78	S-79
			Discharge	Discharge	Discharge	Discharge
			(ALL DAY)	(ALL-DAY)	(ALL DAY)	(ALL DAY)
	DATE	2	(AC-FT)	(AC-FT)	(AC-FT)	(AC-FT)
31	JUL	2016	5	2363	2676	7799
30	JUL	2016	5	4183	3873	9461
29	JUL	2016	5	2161	3095	6098
28	JUL	2016	5	1102	1763	5681
27	JUL	2016	5	551	1723	4936
26	JUL	2016	5	-4	1730	6109
25	JUL	2016	5	64	1753	6476
24	JUL	2016	5	694	1762	7477
23	JUL	2016	5	1020	1749	8440
22	JUL	2016	5	1223	1687	6310

Long Term Mean 30day Avearge ET for Lake Alfred (Inches) = -NR-

21	JUL	2016	i	524	1745	4934	
20	JUL	2016		563	1834	5884	
19	JUL	2016		772	993	4901	
18	JUL	2016		2737	3161	6633	
			S-310	S-351	S-352	S-354	L8 Canal Pt
			Discharge	Discharge	Discharge	Discharge	Discharge
			(ALL DAY)				
	DATE	C	(AC-FT)	(AC-FT)	(AC-FT)	(AC-FT)	(AC-FT)
31	JUL	2016	59	1416	896	2017	603
30	JUL	2016	90	1596	1001	2056	602
29	JUL	2016	35	1588	964	1828	611
28	JUL	2016	-8	1293	843	1594	611
27	JUL	2016	-75	637	740	1093	601
26	JUL	2016	-263	397	759	1271	578
25	JUL	2016	-156	315	488	1307	500
24	JUL	2016	13	305	492	1719	396
23	JUL	2016	0	545	531	1727	327
22	JUL	2016	-27	623	549	1045	299
21	JUL	2016	-80	1241	754	803	420
20	JUL	2016	7	1225	765	1360	622
19	JUL	2016	103	1200	307	946	609
18	JUL	2016	145	1005	190	200	600

			S-308	Belo	w S-308	S-80				
			Discharge	Dis	charge	Discharge				
			(ALL DAY)	(AL	L-DAY)	(ALL-DAY)				
	DATE	2	(AC-FT)	(A)	C-FT)	(AC-FT)				
31	JUL	2016	5		2596	1255				
30	JUL	2016	5		2813	-NR-				
29	JUL	2016	5		1534	710				
28	JUL	2016	5		-100	32				
27	JUL	2016	5		218	183				
26	JUL	2016	5		837	587				
25	JUL	2016	5		1236	880				
24	JUL	2016	5		1717	1227				
23	JUL	2016	5		2555	1586				
22	JUL	2016	5		1259	723				
21	JUL	2016	5		441	20				
20	JUL	2016	5		942	170				
19	JUL	2016	5		1515	648				
18	JUL	2016	5		1962	865				
* * *	' NC	)TE:	Discha	irge (1	ALL DAY)	is compute	ed using	🛭 Spillway,	Sector	Gate
and	1									
			Lockag	jes Di	scharges	from 0015	hrs to	2400 hrs.		

—

(I) - Flows preceeded by "I" signify an instantaneous
 flow computed from the single value reported for the day

\* On 11 May 1999, Lake Okeechobee Elevation was switched from Instantaneous 2400 value to an average-daily lake average. On 14 Mar 2001, due to the isolation of various gages within the standard 10 stations, the average of the interior 4 station gages was used as the Lake Okeechobee Elevation. On 05 November 2010, Lake Okeechobee Elevation was switched to a 9 gage mix of interior and edge gages to obtain a more reliable representation of the lake level. On 09 May 2011, Lake Okeechobee Elevation was switched to a 8 gage mix of interior and edge gages to obtain a more reliable representation of the lake level due to isolation of S135 from low lake levels. Today Lake Okechobee elevation is determined from the 4 Int & 4 Edge stations ++ For more information see the Jacksonville District Navigation website at http://www.saj.usace.army.mil/ \$ For information regarding Lake Okeechobee Service Area water restrictions please refer to www.sfwmd.gov

Report Generated 01AUG2016 @ 10:40 \*\* Preliminary Data - Subject to Revision \*\*



# **Classification Tables**

Supplemental Tables used in conjunction with the LORS2008 Release

Guidance Flow Charts

• Class Limits for Tributary Hydrologic Conditions

Table K-2 in the Lake Okeechobee Water Control Plan

<u>6-15 Day Precipitation Outlook Categories</u>

Table ?? in the Lake Okeechobee Water Control Plan

<u>Classification of Lake Okeechobee Net Inflow for Seasonal</u>

<u>Outlook</u>

 Table K-3 in the Lake Okeechobee Water Control Plan

• Classification of Lake Okeechobee Net Inflow for Multi-

Seasonal Outlook

 Table K-4 in the Lake Okeechobee Water Control Plan

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Tributary Hydrologic	Palmer Index	2-wk Mean L.O. Net
Classification*	Class Limits	Inflow Class Limits
Very Wet	3.0 or greater	Greater >= 6000 cfs
Wet	1.5 to 2.99	2500 - 5999 cfs
Near Normal	-1.49 to 1.49	500 - 2499 cfs
Dry	-2.99 to -1.5	-5000 – 500 cfs
Very Dry	-3.0 or less	Less than -5000 cfs

\* use the wettest of the two indicators

### **Classification of Lake Okeechobee Net Inflow Seasonal Outlook**\*

Lake Net Inflow Prediction	Equivalent Depth**	Lake Okeechobee
[million acre-feet]	[feet]	Net Inflow
		Seasonal Outlook
> 0.93	> 2.0	Very Wet
0.71 to 0.93	1.51 to 2.0	Wet
0.35 to 0.70	0.75 to 1.5	Normal
< 0.35	< 0.75	Dry

\*\*Volume-depth conversion based on average lake surface area of 467,000 acres

### Classification of Lake Okeechobee Net Inflow Multi-Seasonal Outlook\*

Lake Net Inflow Prediction	Equivalent Depth**	Lake Okeechobee
[million acre-feet]	[feet]	Net Inflow
		Multi-Seasonal Outlook
> 2.0	> 4.3	Very Wet
1.18 to 2.0	2.51 to 4.3	Wet
0.5 to 1.17	1.1 to 2.5	Normal
< 0.5	< 1.1	Dry

\*\*Volume-depth conversion based on average lake surface area of 467,000 acres

# 6-15 Day Precipitation Outlook Categories\*

6-15 Day Precipitation Outlook Categories	WSE Decision Tree Categories
Above Normal	Wet to Very Wet
Normal	Normal
Below Normal	Dry

\* Corresponds to Table 7-6 in the Lake Okeechobee Water Control Plan

Under Construction