Application of the Lake Okeechobee Regulation Schedule (LORS2008) on 8/26/2019 (ENSO Neutral Condition)

Lake Okeechobee Net Inflow Outlook:

The Lake Okeechobee Net Inflow Outlook has been computed using 4 methods: Croley's method¹, the SFWMD empirical method², a sub-sampling of Neutral years³ and a sub-sampling of warm years of the Atlantic Multi-decadal Oscillation (AMO) in combination with La Nina ENSO years⁴. The results for Croley's method and the SFWMD empirical method are based on the CPC Outlook.

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	Croley's Method ^{1*}		SFWMD Empirical Method ²		Sub-sampling of Neutral ENSO Years ³		Sub-sampling of AMO Warm + Neutral ENSO Years ⁴	
	Value (ft)	Condition	Value (ft)	Condition	Value (ft)	Condition	Value (ft)	Condition
Current (Aug- Jan)	N/A	N/A	3.09	Very Wet	3.48	Very Wet	4.73	Very Wet
Multi Seasonal (Aug- Apr)	N/A	N/A	3.38	Wet	3.72	Wet	5.50	Very 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.

**Sub-sampling is a weighted average of ENSO conditions based on the ENSO forecast used.

Tributary Hydrologic Conditions Graph:

15,895 cfs 14-day running average for Lake Okeechobee Net Inflow through 8/25/2019. According to the classification in <u>Tributary Hydrologic Conditions</u> table, this condition is Very Wet.

1.53 for Palmer Index on 8/24/2019.

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

The wetter of the two conditions above is **Very Wet**.

LORS2008 Classification Tables:

Lake Okeechobee Stage on 8/26/2019

Lake Okeechobee Stage: 13.44 feet

USACE Report for Lake Okeechobee

Lake Okeechobee Stage Hydrograph

	ee Management Band	Bottom Elevation (feet, NGVD)	Current Lake Stage
High Lake Manage	ement Band	16.40	
	High sub-band	16.01	
Operational Band	Intermediate sub-band	15.60	
	Low sub-band	13.80	
Base Flow sub-ba	nd	12.60	← 13.44
Beneficial Use sub	o-band	12.26	
Water Shortage M	lanagement Band		

Part C of LORS2008: Discharge to WCA's

Release Guidance Flow Chart Outcome: Up to maximum practicable releases to the WCAs if desirable or with minimum everglades impacts; otherwise no releases.

Part D of LORS2008: Discharge to Tidewater

Release Guidance Flow Chart Outcome: S-79 Up to 450 cfs & S-80 Up to 200 cfs.

Adaptive Protocol's Release Guidance: Caloosahatchee Estuary

Release Guidance Flow Chart Outcome: No releases.

Back to Lake Okeechobee Operations Main Page

Back to U.S. Army Corps of Engineers LORSS Homepage

LORS2008 Implementation on 08/26/2019 (ENSO Neutral Condition):

Status for week ending 08/26/2019:

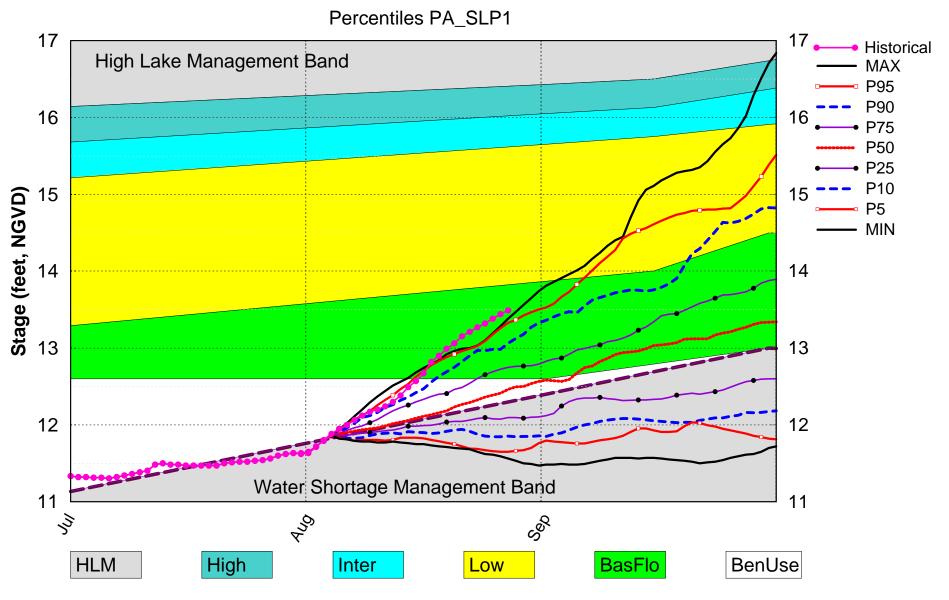
District wide, Raindar rainfall was 0.92 inches for the week. Lake stage on 8/26/2019 was 13.44 ft, NGVD, up 0.45 ft from last week .The updated August 2019 SFWMM Dynamic Position Analysis percentile graph for Lake Okeechobee show that the current lake stage is in the Base-Flow Sub-Band. The LORS2008 Tributary Hydrologic Conditions (THC) are classified as **Very Wet.** The PDI indicates wet conditions and the LONIN is very wet. The THC classification is based on the wetter of the two indices.

Water Supply Risk Evaluation

Area	Indicator	Value	Color Coded Scoring Scheme
	Projected LOK Stage for the next two months	Base-Flow Sub-Band	L
	Palmer Index for LOK Tributary Conditions	1.53 (Normal to Extremely Wet)	٦
	CDC Propinitation Outlank	1 month: Normal	L
LOK	CPC Precipitation Outlook	3 months: Above Normal	Ш
	LOK Seasonal Net Inflow Outlook ENSO Forecast (positive)	3.48 ft (Normal to Extremely Wet)	L
	LOK Multi-Seasonal Net Inflow Outlook	3.72 ft (Wet)	L
	ENSO Forecast (positive)		
	WCA 1: Canal Gauge (Site 1-8C)	Above Line 1 (16.69 ft)	L
WCAs	WCA 2A: Site 2-17 HW	Above Line 1 (12.98 ft)	L
	WCA-3A: 3 Station Average (Site 63, 64, and 65)	Above Line 1 (10.38 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

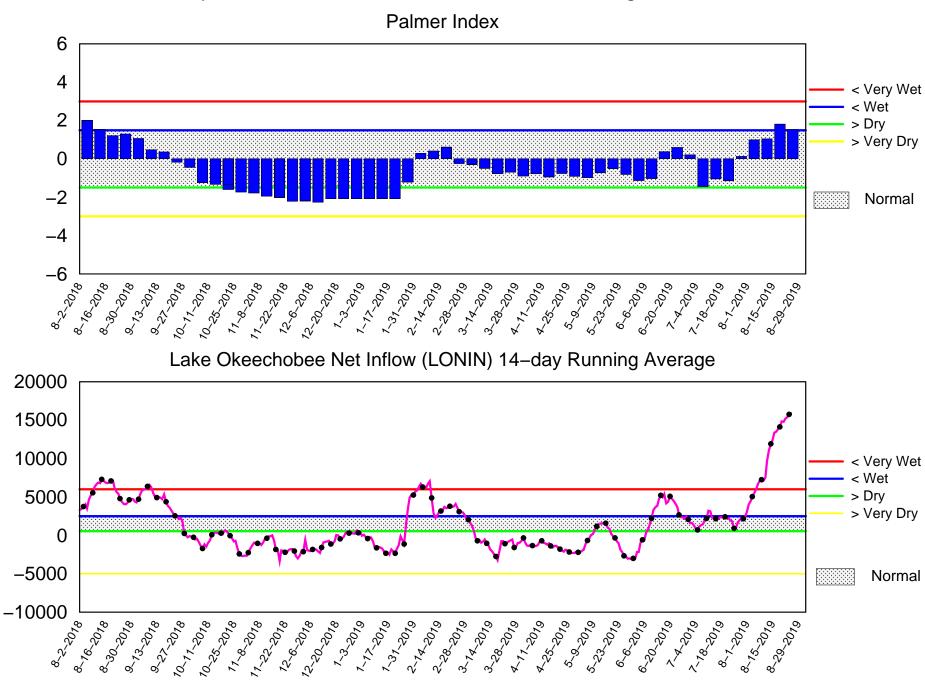
Note: The water supply risk classification based on the Palmer index, as well as the LOK seasonal and multi-seasonal net inflow outlooks use slightly different classification intervals than those used by the 2008-LORS.

Lake Okeechobee SFWMM Aug 2019 Position Analysis



(See assumptions on the Position Analysis Results website)

Tributary Basin Condition Indicators as of August 26 2019

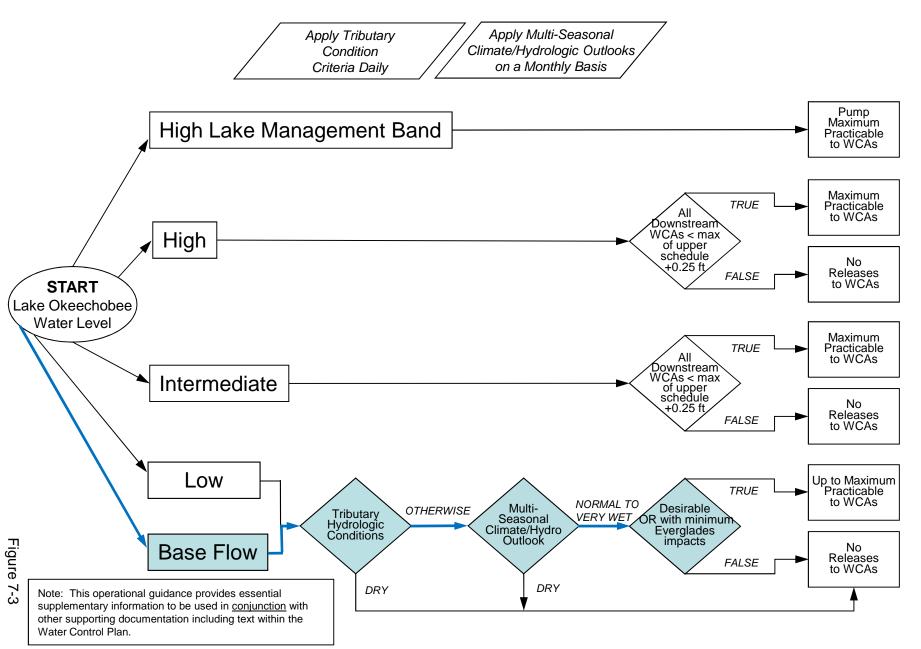


Mon Aug 26 15:13:05 EDT 2019

Flow (cfs)

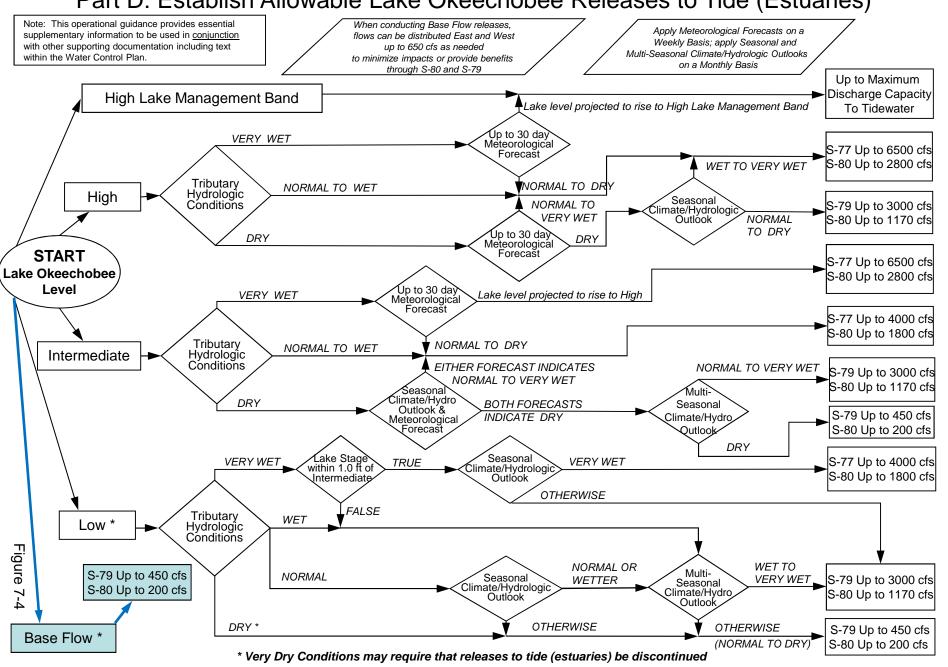
2008 LORS

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

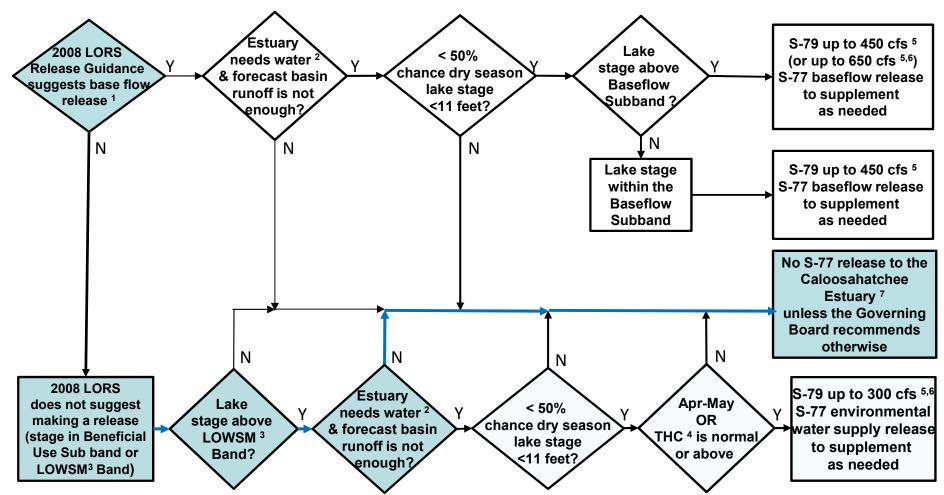


2008 LORS

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



Flowchart to Guide Recommendations for Lake Okeechobee Releases to the Caloosahatchee Estuary for 2008 LORS Baseflow & for Environmental Water Supply (revised 9-Aug-2012)



¹The 2008 LORS Release Guidance (Part D) can suggest baseflow releases in the Intermediate, Low, or Baseflow Subbands.

²Estuary "needs" water when the 30-day moving average salinity at I-75 bridge is projected to exceed 5 practical salinity units (psu) within 2 weeks.

³LOWSM = Lake Okeechobee Water Shortage Management.

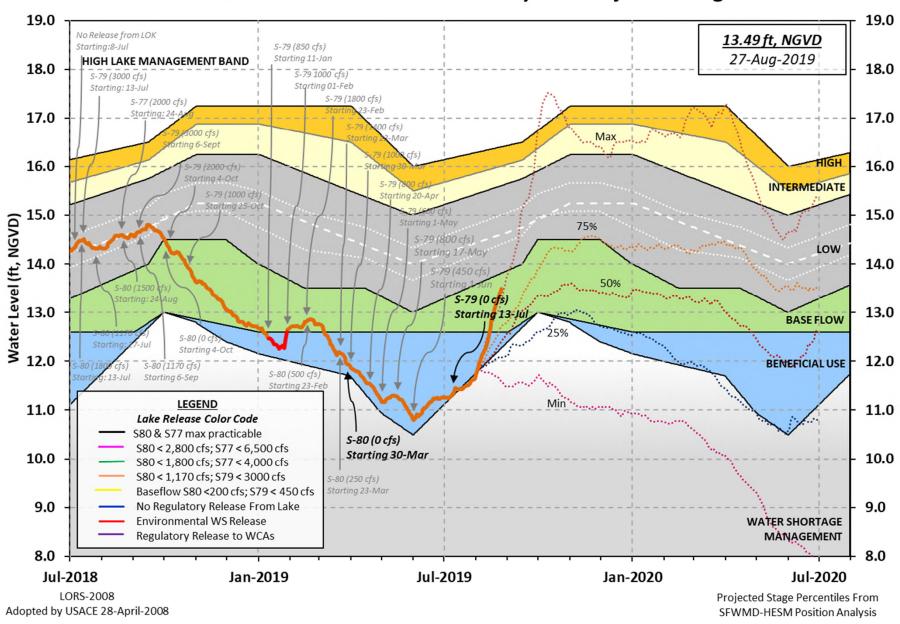
⁴Tributary Hydrologic Condition (THC) is based on classification of Lake Okeechobee Net Inflow and Palmer Index.

⁵Can release less than the "up to" limit if lower release is sufficient to reach or sustain desired estuary salinity; cfs = cubic feet per second.

⁶After reviewing conditions in Water Conservation Areas (WCAs), Stormwater Treatment Areas (STAs), ENP, St. Lucie Estuary and Lake Okeechobee.

⁷Should this condition be reached, the Governing Board will be briefed at their next regularly scheduled meeting as part of the State of the Water Resources agenda item.

Lake Okeechobee Water Level History and Projected Stages



Data Ending 2400 hours 25 AUG 2019

		AUG 2019			
Okeechobee Lake	Regulation			ar 2YRS Ago D) (ft-NGVD)	
*Okeechobee La Bottom of High Currently in (n Lake Mngmt:	= 16.40 Top	of Water Sh		ficial Elv) 26
Simulated Aver Difference fro			13.12 0.31		
25AUG (1965-20 Difference fro			erage 14.9 -0.6	_	
Today Lake Oke stations	eechobee ele	vation is det	termined fro	n the 4 Int &	4 Edge
++Navigation I	Depth (Based	on 2007 Char	nnel Conditi	on Survey) Rou	te 1 ÷
++Navigation I 5.58'		on 2008 Char	nnel Conditi	on Survey) Rou	te 2 ÷
Bridge Clearar	nce = 49.26'				
_					
4 Interior and 4	ł Edge Okeecl	hobee Lake Av	verage (Avg-1	Daily values):	
L001 L005 13.41 13.49	L006 LZ40 13.47 13.4			5133 13.39	
*Combination Ok	seechobee A	vg-Daily Lake	_	13.44 (*See Note)	
_					
Okeechobee Inflo	ows (cfs):				
S65E		S65EX1	2455	Fisheating Cr	
S154		S191	63	S135 Pumps	0
S84		S133 Pumps	44	S2 Pumps	0
S84X		S127 Pumps	54	S3 Pumps	0
S71 S72		S129 Pumps S131 Pumps	16 11	S4 Pumps C5	0 0
Total Inflows:	11775	5131 Քաարհ	11	CS	U
Okeechobee Outfl	ows (cfs):				
S135 Culverts		S354	0	S77	2
S127 Culverts		S351	0	S308	-2
S129 Culverts		S352	0		
S131 Culverts Total Outflows:	0 -158	L8 Canal Pt	-158		

****S77 structure flow is being used to compute Total Outflow.
****S308 structure flow is being used to compute Total Outflow.

Okeechobee Pan Evaporation (inches):

\$77 0.26 \$308 0.23

Average Pan Evap x 0.75 Pan Coefficient = 0.18" = 0.02'

Lake Average Precipitation using NEXRAD: = 0.02" = 0.00'

Evaporation - Precipitation: = 0.16" = 0.01'

Evaporation - Precipitation using Lake Area of 730 square miles

is equal to 3214 cfs out of the lake.

Lake Okeechobee (Change in Storage) Flow is 12503 cfs or 24800 AC-FT

_

	Headwater	Tailwater				Gat	te Pos	sition	ns	
	Elevation	Elevation	Disch	#1	#2	#3	#4	#5	#6	#7
#8	(ft-msl)	(ft-msl)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft) (ft)
(ft)										
North East S	homo	(I) see n	ote at	bott	om				
S133 Pumps		13.35	44	51	0	0	0	0	(cfs)	
S193:		13.33	11	21	U	U	U	U	(CIS)	
S191:	18.75	13.36	63	0.0	0.1	0.0				
S135 Pumps	: 13.16	13.34	0	0	0	0	0		(cfs)	
S135 Culve	rts:		0	0.0	0.0					
North West S	hore									
S65E:	20.90	13.58	5424	2.6	2.5	2.0	2.0	2.0	2.0	
S65EX1:	20.90	13.58	2455							
S127 Pumps	: 13.36	13.37	54	0	0	47	13	0	(cfs)	
S127 Culve	rt:		0	0.0						
S129 Pumps	: 12.79	13.48	16	0	12	0			(cfs)	
S129 Culve	rt:		0	0.0						
S131 Pumps	: 12.78	13.84	11	0	12				(cfs)	
S131 Culve			0							
Fisheating	Creek									
nr Palmd		33.10	1146							
nr Lakep	ort									
C5:		-NR-	0	-NF	RNF	RNI	? -			
South Shore										
S4 Pumps:	10.95	13.50	0	0	0	0			(cfs)	
S169:	13.54	10.95	0	0.0	0.0	0.0				
S310:	13.47		-15							

```
S3 Pumps: 9.23 13.55 0 0 0 0 0 (cfs)
S354: 13.55 9.23 0 0.0 0.0
S2 Pumps: 9.48 -NR- 0 -NR- -NR- -NR- -NR- (cfs)
S351: -NR- 9.48 0 0.0 0.0 0.0
S352: 9.58 0 0.0 0.0
C10A: -NR- 13.90 8.0 8.0 8.0 0.0
 S352: ___
             -NR- 13.90
                                     8.0 8.0 8.0 0.0 0.0
                      13.71 -158
 L8 Canal PT
                S351 and S352 Temporary Pumps/S354 Spillway
             9.48
 S351:
                      -NR- 0 -NR--NR--NR--NR--NR-
 S352:
             9.58
                                 0 -NR--NR--NR--NR-
             9.23 13.55 0 -NR--NR--NR-
 S354:
Caloosahatchee River (S77, S78, S79)
 S47B: 13.32 12.83
                                     1.5 2.0
                      10.68 73 1.0
 S47D:
             12.71
 S77:
   Spillway and Sector Preferred Flow:
             13.30 10.65 0 0.0 0.0 0.0 0.0
   Flow Due to Lockages+:
                                 2
 S78:
   Spillway and Sector Flow:
            10.66 2.80 733 0.0 2.5 0.0 0.0
  Flow Due to Lockages+:
                                11
 S79:
   Spillway and Sector Flow:
              2.97 1.47 2658 1.0 1.0 1.0 2.0 2.0 2.0 1.0
1.0
   Flow Due to Lockages+:
             flow from S77 0 (ppm) 44
   Percent of flow from S77
                                 0%
   Chloride
St. Lucie Canal (S308, S80)
 S308:
   Spillway and Sector Preferred Flow:
             13.40 14.24 0 0.0 0.0 0.0 0.0
   Flow Due to Lockages+:
                                 -2
       19.03 14.10 0 0.0 0.0
 S153:
 S80:
   Spillway and Sector Flow:
   14.37 0.82 0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Flow Due to Lockages+: 14
   Percent of flow from S308 NA %
 Steele Point Top Salinity (mg/ml) ****
 Steele Point Bottom Salinity (mg/ml) ****
 Speedy Point Top Salinity (mg/ml) ****
 Speedy Point Bottom 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.
- ++ Preferred flow is determined from either the spillway discharge or the below flow meter daily

---- Wind ---Daily Precipitation Totals 1-Day 3-Day 7-Day Direction Speed (inches) (inches) (inches) (Degø) (mph) 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: 0.00 0.00 -NR-0.00 0.00 S127 Pump Station: -NR-S129 Pump Station: -NR-0.00 0.00 S131 Pump Station: -NR-0.00 0.00 S77: 2.73 2.78 2.87 111 S78: 22.53 22.53 22.83 338 1 S79: 32.21 27 31.85 32.06 S4 Pump Station: 0.00 0.00 -NR-Clewiston Field Station: 0.00 -NR-0.00 0.00 0.00 S3 Pump Station: -NR-S2 Pump Station: -NR-0.00 0.00 23.24 S308: 23.17 23.24 72 2 24.58 S80: 24.01 24.31 306 3 Okeechobee Average 12.95 2.00 2.01 (Sites S78, S79 and S80 not included) Oke Nexrad Basin Avg 0.02 0.13 0.35 ______

_ Okeechobee Lake Elevations	25 AUG 2019	13.44 Difference from	
25AUG19			
25AUG19 - 1 Day =	24 AUG 2019	13.38 -0.06	5
25AUG19 -2 Days =	23 AUG 2019	13.32 -0.12	2
25AUG19 -3 Days =	22 AUG 2019	13.27 -0.17	7
25AUG19 -4 Days =	21 AUG 2019	13.21 -0.23	3
25AUG19 -5 Days =	20 AUG 2019	13.15 -0.29)
25AUG19 -6 Days =	19 AUG 2019	13.06 -0.38	3
25AUG19 -7 Days =	18 AUG 2019	12.99 -0.45	5
25AUG19 -30 Days =	26 JUL 2019	11.54 -1.90)
25AUG19 -1 Year =	25 AUG 2018	14.54 1.10)
25AUG19 - 2 Year =	25 AUG 2017	-NRNR-	-

Long Term Mean 30day Avearge ET for Lake Alfred (Inches) = 4.39

25AUG19	-13	Days				ムしエン			1 1001
		_				2019	715	TUE	1001
25AUG19		_				2019	935	WED	3564
25AUG19		_				2019	1248	THU	5049
25AUG19		_				2019	1439	FRI	3328
25AUG19		Days				2019	1551	SAT	2025
25AUG19		Days				2019	1692	SUN	2500
25AUG19		Days				2019	1835	MON	2583
25AUG19		Days				2019	1966	TUE	2524
25AUG19		Days				2019	2111	WED	2660
25AUG19		Days				2019	2261	THU	2702
25AUG19		Days				2019	2395	FRI	2696
25AUG19		Days				2019	2516	SAT	2623
25AUG19	-1	Day				2019	2626	SUN	2472
25AUG19		Today	√ =			2019	2727	MON	2455
				Average			previous	14 days	Avg-Daily Flow
					91	65EX1			
25AUG19 25AUG19						2019 2019	1951 1935	WED TUE	964
25AUG19		_				2019	1897	THU	2
25AUG19		_				2019	2018	FRI	2730
25AUG19		Days				2019	2280	SAT	4935
25AUG19		Days				2019	2565	SUN	5356
25AUG19		Days				2019	2853	MON	5606
25AUG19		Days				2019	3159	TUE	5852
25AUG19		Days				2019	3448	WED	5988
25AUG19		Days				2019	3718	THU	6016
25AUG19		Days				2019	3967	FRI	6005
25AUG19		Days				2019	4203	SAT	5913
25AUG19		Day				2019	4396	SUN	5795
25AUG19		Today				2019	4580	MON	5756
05377010		ma-1.	_		Flor		previous		Avg-Daily Flow
25AUG19		_				2019	10260	TUE	15327
25AUG19 25AUG19						2019	11672	WED	21528
25AUG19 25AUG19		_				2019	12669	THU	15730
25AUG19 25AUG19		-				2019	13036	FRI	19310
25AUG19 25AUG19		Days				2019	13958	SAT	29242
25AUG19 25AUG19		Days				2019	14409	SUN	15327
25AUG19 25AUG19		Days				2019	14409	MON	17696
25AUG19 25AUG19		Days				2019	14808	TUE	14671
25AUG19 25AUG19		Days				2019	15327	WED	19058
25AUG19 25AUG19		Days				2019	15399	THU	12705
25AUG19 25AUG19		Days				2019	15622	FRI	10588
25AUG19 25AUG19		Day Days				2019 2019	16314 15968	SUN SAT	12705
		roday				2019	16364	MON	12503
25AUG19		n1		2.5	7 770	2010	1 () (1	MONT	10500

S-7 Disch (ALL DATE (AC- 25 AUG 2019 24 AUG 2019 23 AUG 2019 22 AUG 2019 21 AUG 2019 20 AUG 2019 19 AUG 2019 18 AUG 2019 17 AUG 2019 16 AUG 2019 16 AUG 2019 15 AUG 2019 14 AUG 2019 13 AUG 2019 14 AUG 2019 15 AUG 2019	narge Discharge DAY) (ALL-DAY)	Discharge	S-79 Discharge (ALL DAY) (AC-FT) 5283 6454 7904 8624 9362 11021 -NR- 15141 14062 16733 14448 12538 14899 11311	
S-3	310 S-351	S-352	S-354	L8 Canal Pt
Disch			Discharge	Discharge
(ALL		_	(ALL DAY)	(ALL DAY)
DATE (AC-	-FT) (AC-FT)	(AC-FT)	(AC-FT)	(AC-FT)
	-30 0	0	0	-313
	-49 0	0	0	-350
	-15 0	0	0	-384
	211 0	0 0	0	-393 -426
	350 0 244 0	0	0	-426 -494
19 AUG 2019 2	33 0	0	0	-494 -600
	217 0	0	0	-700
	164 0	0	0	-741
	227 0	0	0	-543
	L93 0	0	0	-447
	215 0	0	0	-452
	L98 0	0	0	-362
12 AUG 2019 -2	238 0	0	0	-196
S-3	308 Below S-3	08 S-80		
Disch				
(ALL				
DATE (AC-		(AC-FT)		
25 AUG 2019	-4 -187	27		
24 AUG 2019	-0 79	39		
23 AUG 2019	-1 137	12		
22 AUG 2019	-2 193	19		
21 AUG 2019	-2 45	19		
20 AUG 2019	-1 164	23		
	NR1259 L46 -22	23 40		
	397 –649	43		
16 AUG 2019 -11		38		
15 AUG 2019 -12		19		
14 AUG 2019 -13		15		
13 AUG 2019	-1 -221	7		
12 AUG 2019 -18	353 -1095	19		

*** NOTE: Discharge (ALL DAY) is computed using Spillway, Sector Gate and

Lockages Discharges from 0015 hrs to 2400 hrs.

(I) - Flows preceded 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

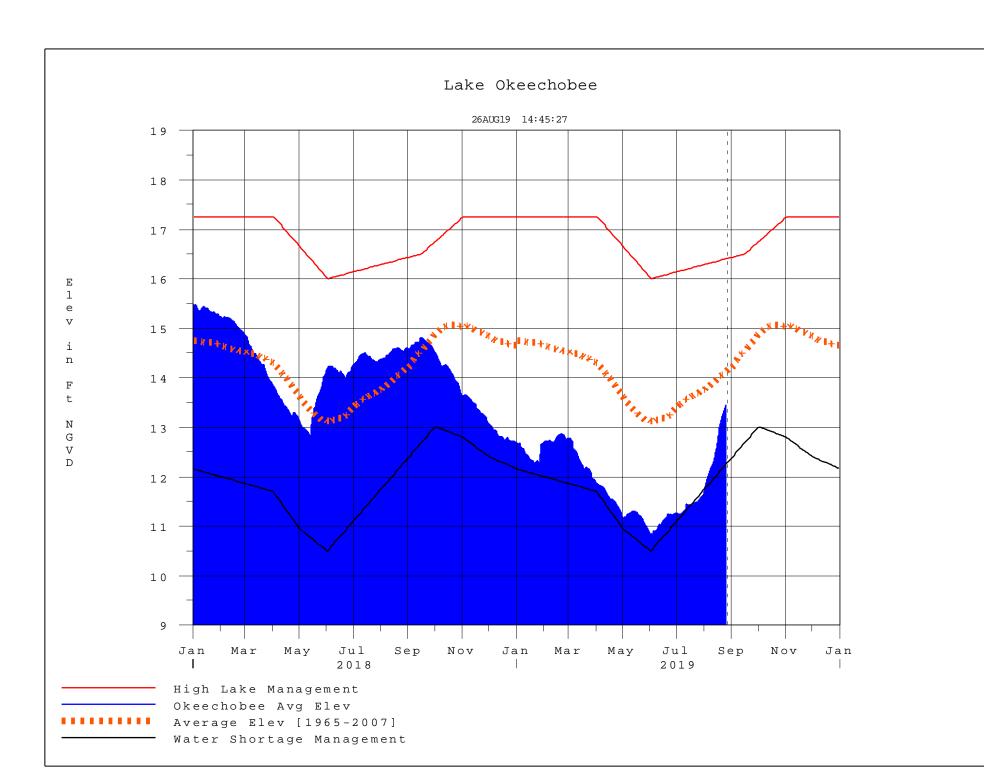
++ For more information see the Jacksonville District Navigation website at http://www.saj.usace.army.mil/

\$ For information regarding Lake Okeechobee Service Area water restrictions

please refer to www.sfwmd.gov

-- Report Generated 26AUG2019 @ 14:39 ** Preliminary Data - Subject to Revision

Report Generated 26AUG2019 @ 14:39 ** 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

• 6-15 Day Precipitation Outlook Categories

Table ?? in the Lake Okeechobee Water Control Plan

• Classification of Lake Okeechobee Net Inflow for Seasonal

Outlook

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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Back to U.S. Army Corps of Engineers Lake Okeechobee Operations Homepage

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
	20003	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