Application of the Lake Okeechobee Regulation Schedule (LORS2008) on 9/16/2019 (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*}		Empirical		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 (Sep- Feb)	N/A	N/A	1.55	Wet	1.89	Wet	3.36	Very Wet
Multi Seasonal (Sep- Apr)	N/A	N/A	1.74	Normal	1.99	Normal	3.68	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:

4,117 cfs 14-day running average for Lake Okeechobee Net Inflow through 9/15/2019. According to the classification in <u>Tributary Hydrologic Conditions</u> table, this condition is Wet.

-0.63 for Palmer Index on 8/17/2019.

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

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

LORS2008 Classification Tables:

Lake Okeechobee Stage on 9/16/2019

Lake Okeechobee Stage: 13.89 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	16.50	
	High sub-band	16.13	
Operational Band	Intermediate sub-band	15.75	
	Low sub-band	14.00	
Base Flow sub-ba	nd	12.79	← 13.89
Beneficial Use sub	o-band	12.69	
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 09/16/2019 (ENSO Neutral Condition):

Status for week ending 09/16/2019:

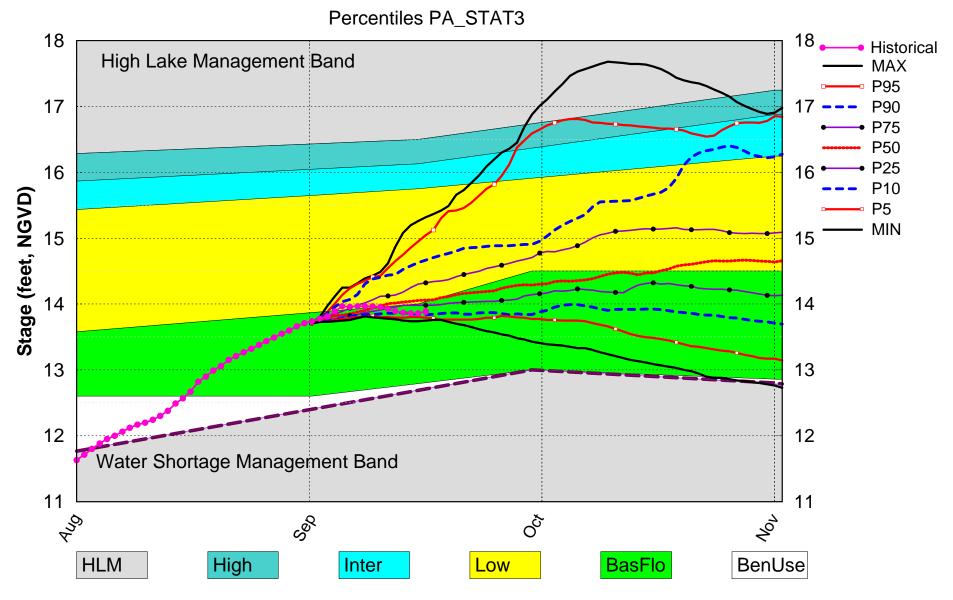
District wide, Raindar rainfall was 0.84 inches for the week. Lake stage on 9/16/2019 was 13.89 ft, NGVD, down 0.08 ft from last week .The updated September 2019 SFWMM Dynamic Position Analysis percentile graph for Lake Okeechobee show that the current lake stage is in the Low Sub-Band. The LORS2008 Tributary Hydrologic Conditions (THC) are classified as **Wet.** The PDI indicates normal conditions and the LONIN is 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	M
	Palmer Index for LOK Tributary Conditions	-0.63 (Normal to Extremely Wet)	L
	CDC Procinitation Outlook	1 month: Above Normal	Ш
LOK	CPC Precipitation Outlook	3 months: Above Normal	L
	LOK Seasonal Net Inflow Outlook ENSO Forecast (positive)	1.89 ft (Normal to Extremely Wet)	L
	LOK Multi-Seasonal Net Inflow Outlook	1.99 ft (Normal)	M
	ENSO Forecast (positive)		
	WCA 1: Canal Gauge (Site 1-8C)	Above Line 1 (16.55 ft)	L
WCAs	WCA 2A: Site 2-17 HW	Above Line 1 (12.67 ft)	L
	WCA-3A: 3 Station Average (Site 63, 64, and 65)	Above Line 1 (10.58 ft)	L
	Service Area 1	Year-Round Irrigation Rule in effect	اد
LEC	Service Area 2	Year-Round Irrigation Rule in effect	L
	Service Area 3	Year-Round Irrigation Rule in effect	L

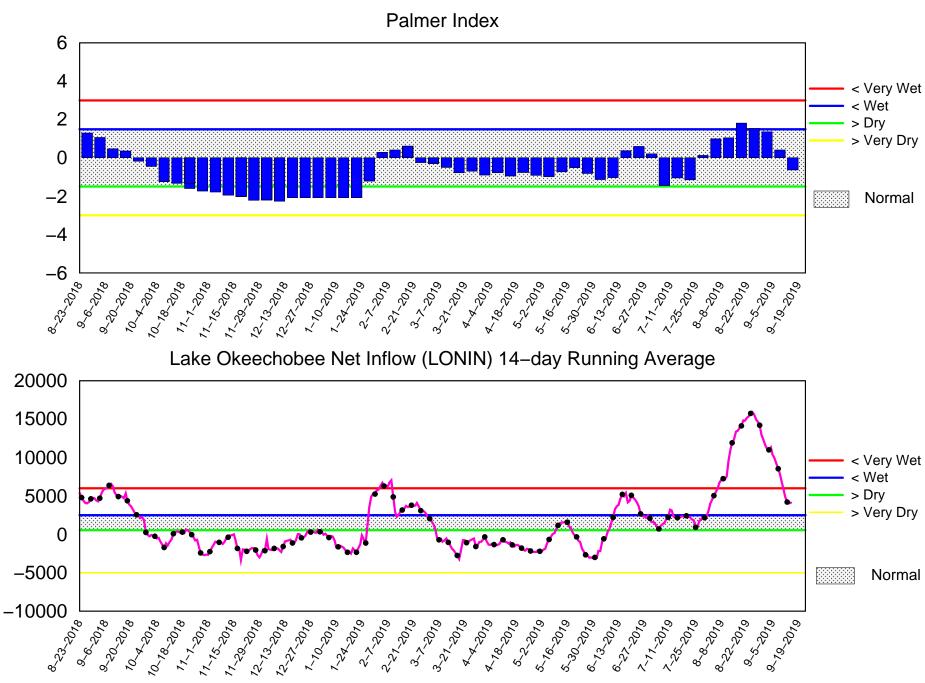
Note: The water supply risk classification based on the Palmer index, as well as the LOK seasonal and multi-seasonal net inflow outlooks use slightly different classification intervals than those used by the 2008-LORS.

Lake Okeechobee SFWMM Sep 2019 Position Analysis



(See assumptions on the Position Analysis Results website)

Tributary Basin Condition Indicators as of September 16 2019

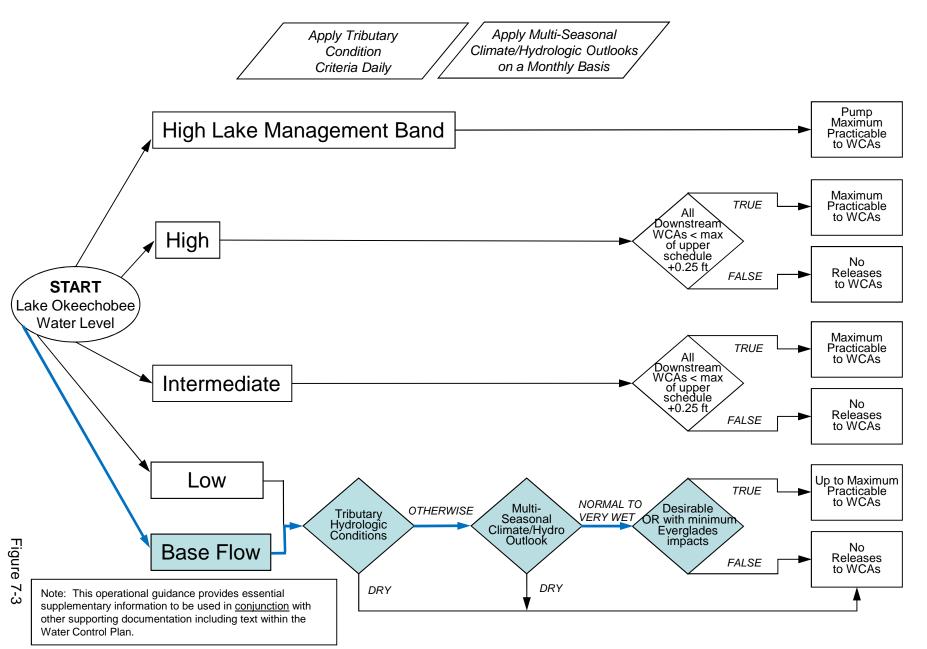


Mon Sep 16 14:54:42 EDT 2019

Flow (cfs)

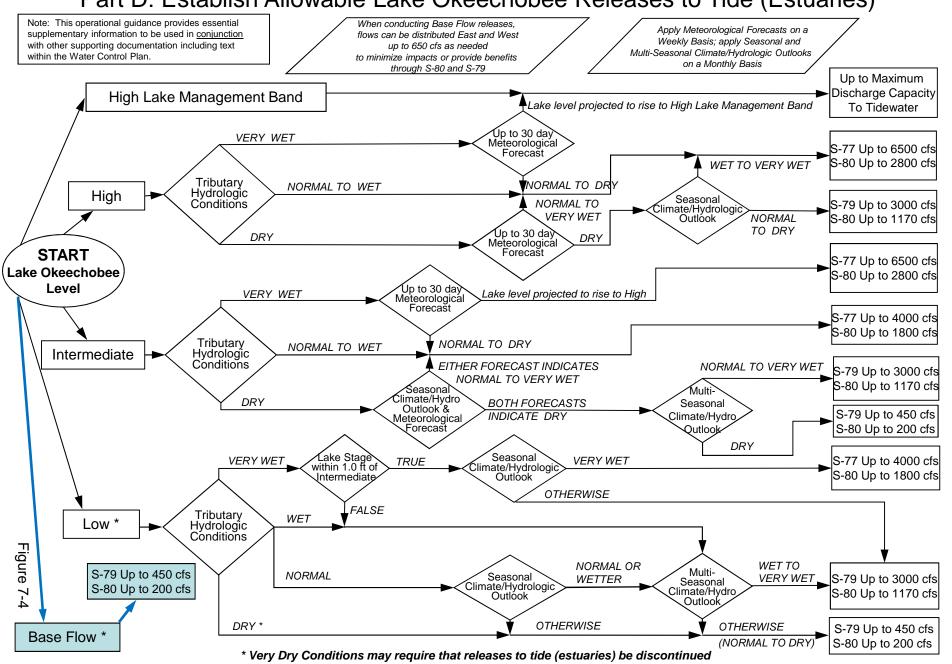
2008 LORS

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

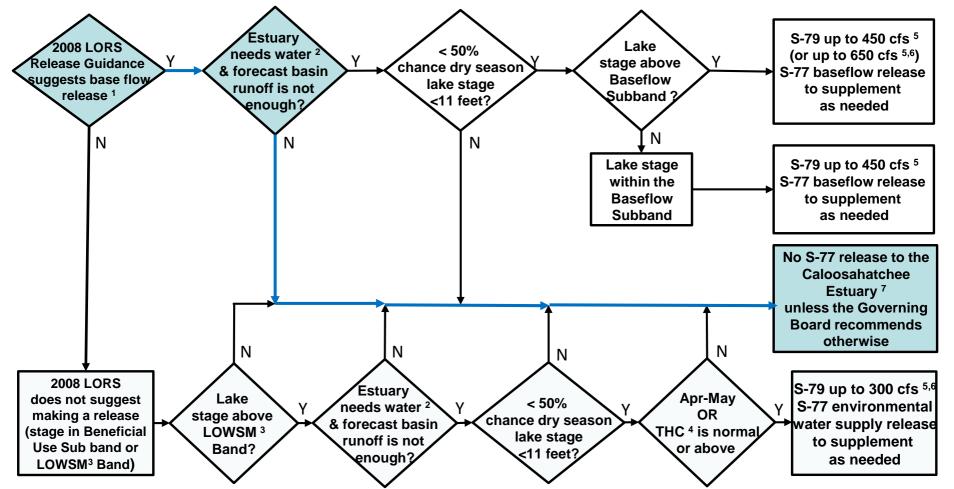


2008 LORS

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.

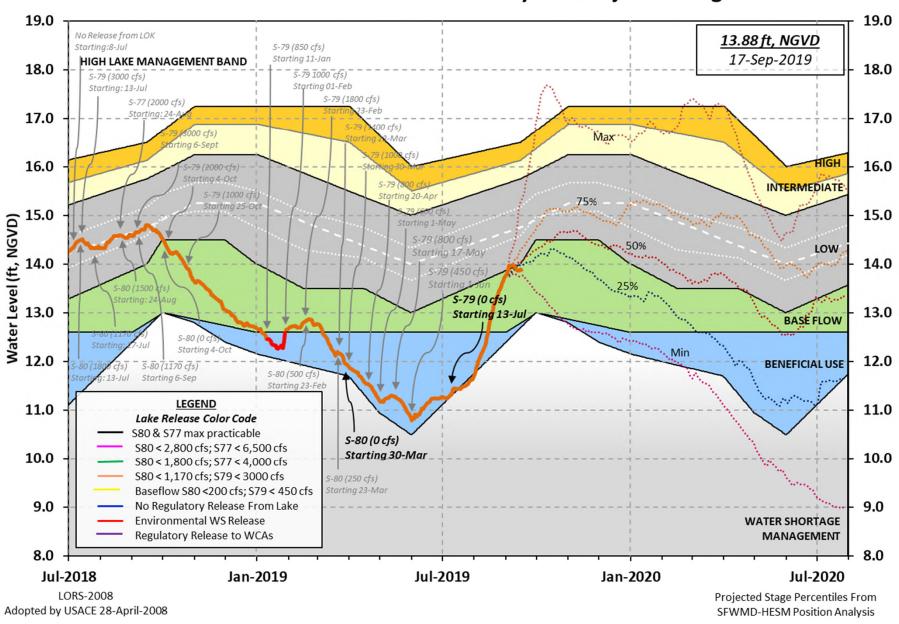
⁴Tributary Hydrologic Condition (THC) is based on classification of Lake Okeechobee Net Inflow and Palmer Index.

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 15 SEP 2019

Okeechobee Lake	_	(ft-NGVI)) (ft-NGV	ar 2YRS Ago D) (ft-NGVD)	
	h Lake Mngm		of Water Sh	0 -NR- (Off ort Mngmt= 12.6	ficial Elv) 59
Simulated Ave: Difference from	_	08 [1965-2000] LORS2008	13.49 0.40		
15SEP (1965-2) Difference from		of Record Ave age	erage 14. -0.6		
Today Lake Okostations	eechobee el	evation is det	ermined fro	m the 4 Int & 4	4 Edge
++Navigation 17.83'	Depth (Base	d on 2007 Char	nnel Conditi	on Survey) Rout	te 1 ÷
++Navigation	Depth (Base	d on 2008 Char	nnel Conditi	on Survey) Rout	te 2 ÷
6.03' Bridge Cleara	nce = 49.25	1			
_					
4 Interior and	4 Edge Okee	chobee Lake Av	verage (Avg-	Daily values):	
		0 S4 S35 90 13.92 14.		S133 13.75	
*Combination 0	keechobee	Avg-Daily Lake	_	13.89 (*See Note)	
_	(5)				
Okeechobee Inflo	ows (cis): 206	S65EX1	1985	Fisheating Cr	325
S154	33	S191	0	S135 Pumps	0
S84	60	S133 Pumps	0	S2 Pumps	0
S84X	0	S127 Pumps	0	S3 Pumps	0
S71	68	S129 Pumps	0	S4 Pumps	0
S72	34	S131 Pumps	0	C5	0
Total Inflows:	2710				
Okeechobee Outf	lows (cfs):				
S135 Culverts	0	S354	1909	S77	2
S127 Culverts	0	S351	864	S308	-0
S129 Culverts	0	S352	821		
S131 Culverts Total Outflows:	0 3591	L8 Canal Pt	-3		
	-				

	Headwater	Tailwater				Gat	te Pos	sitior	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 Si	horo	(I) see n	ote at	boti	tom				
S133 Pumps S193:		13.65	0	0	0	0	0	0	(cfs)
S191:	18.67	13.66	0	0.0	0.0	0.0				
S135 Pumps	: 13.07	13.79	0	0	0	0	0		(cfs)
S135 Culve	rts:		0	0.0	0.0					
North West S	hore									
S65E:	21.17	13.43	206	0.0	0.0	0.0	0.0	-0.0	0.0	
S65EX1:			1985							
S127 Pumps		13.75	0	0	0	0	0	0	(cfs)
S127 Culve	rt:		0	0.0						
S129 Pumps	: 12.87	13.79	0	0	0	0			(cfs)
S129 Culve	rt:		0	0.0						
S131 Pumps	: 12.82	13.75	0	0	0				(cfs)
S131 Culve	rt:		0							
Fisheating	Creek									
nr Palmd	ale	32.04	325							
nr Lakep C5:	ort 	-NR-	0	-NR	NI	RNF	? –			
South Shore										
	11.19	13.86	0	0	0	0			(cfs)
S169:	13.97	11.19	6	0.0					(010	,
S310:	13.79	·-/	38	0.0	0.0	· · ·				

```
S3 Pumps: 10.58 13.99 0 0 0 0 0 (cfs)
S354: 13.99 10.58 1909 6.0 6.0
S2 Pumps: 11.08 -NR- 0 0 0 0 0 0 (cfs)
S351: -NR- 11.08 864 1.1 1.1 1.4
S352: 14.11 10.65 821 1.4 1.5
C10A: -NR- 13.41 8.0 8.0 8.0 0.0 0.0
L8 Canal PT 13.25 -3
                  S351 and S352 Temporary Pumps/S354 Spillway
              11.08
                         -NR-
  S351:
                                 864 -NR--NR--NR--NR--NR-
              10.65 14.11 821 -NR--NR--NR-
10.58 13.99 1909 -NR--NR--NR--NR-
  S352:
  S354:
Caloosahatchee River (S77, S78, S79)
  S47B: 13.15 12.48
                                        2.0 2.5
  S47D:
              12.49
                       11.12 60 0.0
  S77:
   Spillway and Sector Preferred Flow:
              13.56 11.03 0 0.0 0.0 0.0 0.0
                                    2
   Flow Due to Lockages+:
  S78:
    Spillway and Sector Flow:
             11.06 3.05 78 0.0 0.0 0.0 0.0
                                   9
   Flow Due to Lockages+:
  S79:
   Spillway and Sector Flow:
              3.15 1.15 667 0.0 0.0 0.0 0.0 0.0 1.0 0.0
0.0
   Flow Due to Lockages+:
              5 Lockages+: 5
flow from S77 0
(ppm) 46
   Percent of flow from S77
                                   0%
   Chloride
St. Lucie Canal (S308, S80)
  S308:
    Spillway and Sector Preferred Flow:
              13.95 14.25 0 0.0 0.0 0.0 0.0
   Flow Due to Lockages+:
                                   -0
        18.59 14.17 48 0.0 0.0
  S153:
  S80:
    Spillway and Sector Flow:
                                  20 0.0 0.0 0.0 0.0 0.0 0.0 0.0
              14.49 2.42
   Flow Due to Lockages+:
                                   16
   Percent of flow from S308
                                    0%
  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-S127 Pump Station: -NR-0.00 0.00 S129 Pump Station: -NR-0.00 0.00 0.00 0.00 S131 Pump Station: -NR-S77: 0.30 0.52 0.54 257 S78: 23.91 23.92 23.92 250 1 S79: 33.04 271 5 33.04 33.04 S4 Pump Station: 0.00 0.00 -NR-Clewiston Field Station: 0.00 0.00 -NR-0.00 0.00 S3 Pump Station: -NR-S2 Pump Station: -NR-0.00 0.00 S308: 25.07 25.69 25.51 328 12 S80: 1.13 1.95 289 2 1.84 Okeechobee Average 12.68 2.00 2.02 (Sites S78, S79 and S80 not included) Oke Nexrad Basin Avg 0.10 0.43 0.72 ______

_ Okeechobee Lake Elevations	15 SEP 2019	13.89 Difference	from
15SEP19			
15SEP19 - 1 Day =	14 SEP 2019	13.86	-0.03
15SEP19 -2 Days =	13 SEP 2019	13.86	-0.03
15SEP19 - 3 Days =	12 SEP 2019	13.87	-0.02
15SEP19 - 4 Days =	11 SEP 2019	13.89	0.00
15SEP19 -5 Days =	10 SEP 2019	13.93	0.04
15SEP19 -6 Days =	09 SEP 2019	13.96	0.07
15SEP19 -7 Days =	08 SEP 2019	13.97	0.08
15SEP19 - 30 Days =	16 AUG 2019	12.82	-1.07
15SEP19 -1 Year =	15 SEP 2018	14.80	0.91
15SEP19 - 2 Year =	15 SEP 2017	-NR-	-NR-

Long Term Mean 30day Avearge ET for Lake Alfred (Inches) = 4.13

	15SEP19	-	Today	=	15	SEP	2019	4123	MON	9946	
	15SEP19		Day				2019	4017	SUN	3649	
	15SEP19		Days				2019	4210	SAT	1055	
	15SEP19		Days				2019	4894	FRI	-261	
	15SEP19		Days				2019	5820	THU	-4271	
	15SEP19		Davs				2019	6881	WED	-2923	
	15SEP19	-6	Days	=			2019	7994	TUE	1202	
	15SEP19		Days				2019	8646	MON	2724	
	15SEP19		Days				2019	9345	SUN	2645	
	15SEP19		Days				2019	10063	SAT	4177	
	15SEP19		_				2019	10521	FRI	-595	
	15SEP19		_				2019	11471	THU	17075	
	15SEP19		_				2019	11159	WED	16940	
	15SEP19		_				2019	11310	TUE	6353	
	1001117		20172		0.2				102		
_											_
											_
_											
							55E				
			_					previous		Avg-Daily Flow	,
	15SEP19		Toda				2019	1149	MON	249	
	15SEP19		Day				2019	1464	SUN	425	
	15SEP19		Days				2019	1763	SAT	0	
	15SEP19		Days				2019	2124		0	
	15SEP19		Days				2019	2476	THU	0	
	15SEP19		Days				2019	2841	WED	0	
	15SEP19		Days		09	SEP	2019	3232	TUE	131	
	15SEP19		Days		08	SEP	2019	3609	MON	760	
	15SEP19	-8	Days	=	07	SEP	2019	3966	SUN	1511	
	15SEP19	-9	Days	=			2019	4272	SAT	1750	
	15SEP19		_				2019	4569	FRI	1953	
	15SEP19	-11	Days	=	04	SEP	2019	4858	THU	2645	
	15SEP19		-		03	SEP	2019	5099	WED	2851	
	15SEP19	-13	Days	=	02	SEP	2019	5323	TUE	3809	
											_
_											
											_
_						Se	55EX1				
					Average			previous	14 davs	Avg-Daily Flow	,
	15SEP19		Toda	y=			2019	3257	MON	1985	
	15SEP19	-1	Day				2019	3259	SUN	1989	
	15SEP19		Days				2019	3258	SAT	2555	
	15SEP19		Days				2019	3216	FRI	2889	
	15SEP19		Days				2019	3165	THU	3201	
	15SEP19		Days				2019	3111	WED	3768	
	15SEP19		Days				2019	3017	TUE	3753	
	15SEP19		Days				2019	2924	MON	3751	
	15SEP19		Days				2019	2832	SUN	3762	
	15SEP19		Days				2019	2740	SAT	3743	
	15SEP19		_				2019	2659	FRI	3771	
	15SEP19						2019	2583	THU	3715	
	15SEP19		_				2019	2510	WED	3801	
	15SEP19						2019	2429	TUE	2919	
	T 20 FF T 3	13	Days	_	02	O Li E	2017	2429	1011	1 2010	

DATE 15 SEP 2019 14 SEP 2019 13 SEP 2019 11 SEP 2019 10 SEP 2019 09 SEP 2019 08 SEP 2019 06 SEP 2019 06 SEP 2019 06 SEP 2019 04 SEP 2019 03 SEP 2019	362 1335 1637 1685 4 7 4 7 4 5 7 5	Below S-77 Discharge (ALL-DAY) (AC-FT) 43 469 1278 1385 1198 -29 74 81 233 122 234 288 -149	S-78 Discharge (ALL DAY) (AC-FT) 165 433 719 1182 192 304 302 320 387 597 781 1081 1691	S-79 Discharge (ALL DAY) (AC-FT) 1320 1162 391 3036 752 1797 1723 1653 1583 1783 2979 3737 4591	
02 SEP 2019		127	1870	5436	
J_ J_L	•	-2,	_0,0	2130	
	S-310 Discharge (ALL DAY)	S-351 Discharge (ALL DAY)	(ALL DAY)	S-354 Discharge (ALL DAY)	L8 Canal Pt Discharge (ALL DAY)
DATE	(AC-FT)	(AC-FT)	(AC-FT)	(AC-FT)	(AC-FT)
15 SEP 2019		1713	1627	1176	-7
14 SEP 2019		851	1568	1346	4
13 SEP 2019		875	1546	1801	7
12 SEP 2019		1441	1845	2021	3 6
11 SEP 2019		2393	1842	1981	6
10 SEP 2019 09 SEP 2019		2449	1837 1767	2068 2114	4
08 SEP 2019		2411 1809	1580	1733	0
06 SEP 2019 07 SEP 2019		1783	1527	1678	-7
06 SEP 2019		1071	1199	1575	- 7 -11
05 SEP 2019		672	794	1317	-11 -49
04 SEP 2019		0	0	222	-49
04 SEP 2019		0	0	0	- 1 5
02 SEP 2019		0	0	0	- 9
02 556 2012	, 11	O	O	0	,
	S-308	Below S-308	3 S-80		
	Discharge	Discharge	Discharge	2	
	(ALL DAY)	(ALL-DAY)	(ALL-DAY)		
DATE	(AC-FT)	(AC-FT)	(AC-FT)		
15 SEP 2019		-166	72		
14 SEP 2019		165	31		
13 SEP 2019	-0	78	759		
12 SEP 2019	9 -1	68	284		
11 SEP 2019		135	457		
10 SEP 2019		113	42		
09 SEP 2019		89	45		
08 SEP 2019		94	476		
07 SEP 2019		-104	100		
06 SEP 2019		-260	38		
05 SEP 2019		-310	49		
04 SEP 2019		-314	905		
03 SEP 2019		68	697		
02 SEP 2019) -NR-	-46	959		

*** 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

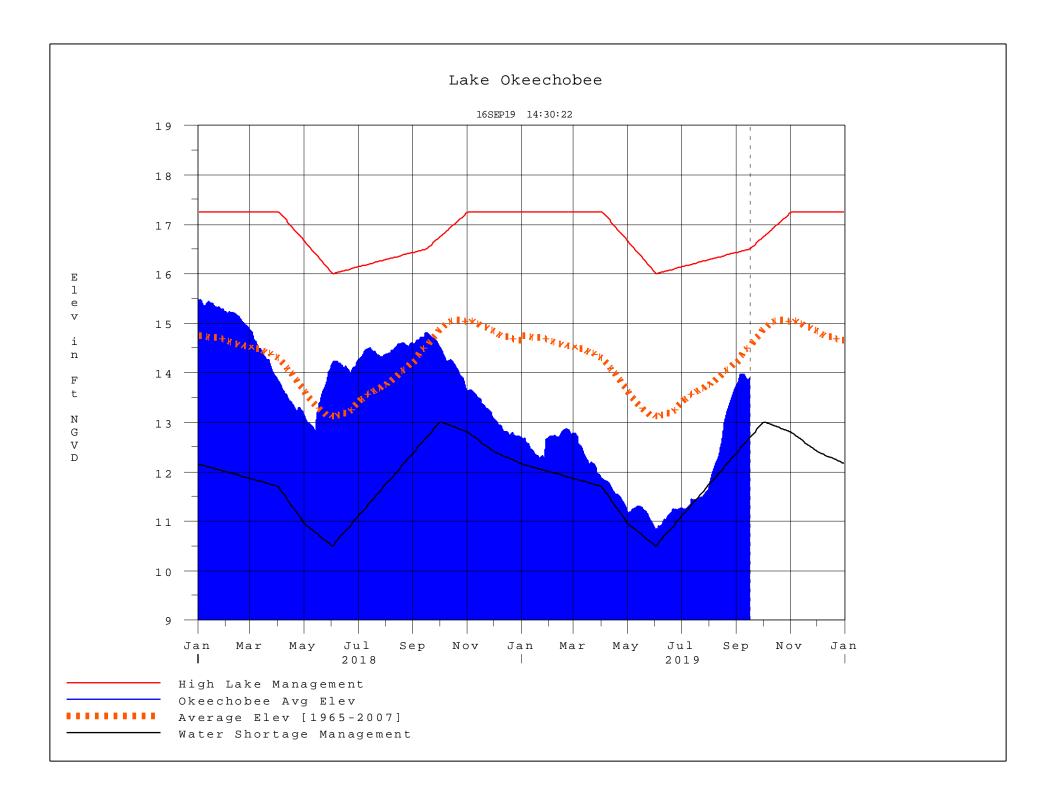
++ For more information see the Jacksonville District Navigation website at http://www.saj.usace.army.mil/

\$ For information regarding Lake Okeechobee Service Area water restrictions

please refer to www.sfwmd.gov

-- Report Generated 16SEP2019 @ 14:39 ** Preliminary Data - Subject to Revision

Report Generated 16SEP2019 @ 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

Back to Lake Okeechobee Operations Main Page

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