Application of the Lake Okeechobee Regulation Schedule (LORS2008) on 4/1/2019 (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		oley's ethod ^{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 (Apr- Sep)	N/A	N/A	1.97	Wet	2.34	Very Wet	2.99	Very Wet
Multi Seasonal (Apr-Oct)	N/A	N/A	2.67	Wet	2.91	Wet	4.05	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:

- **-713 cfs** 14-day running average for Lake Okeechobee Net Inflow through 3/31/2019. According to the classification in <u>Tributary Hydrologic Conditions</u> table, this condition is Dry.
- **-0.90** for Palmer Index on 3/30/2019. 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 4/1/2019

Lake Okeechobee Stage: 11.90 feet

USACE Report for Lake Okeechobee

Lake Okeechobee Stage Hydrograph

Lake Okeechobee Management Zone/Band		Bottom Elevation (feet, NGVD)	Current Lake Stage
High Lake Management Band		17.25	
	High sub-band	16.50	
Operational Band	Intermediate sub-band	15.50	
	Low sub-band	13.50	
Base Flow sub-band		12.60	
Beneficial Use sub-band			← 11.90
Water Shortage M	lanagement Band	11.70	

Part C of LORS2008: Discharge to WCA's

Lake Okeechobee stage is within the Beneficial Use Sub-band therefore, no releases to the WCAs to manage lake stages

Part D of LORS2008: Discharge to Tidewater

Lake Okeechobee stage is within the Beneficial Use Sub-band therefore, no releases to the St. Lucie or Caloosahatchee Estuaries to manage lake stages.

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 04/01/2019 (ENSO El Niño Condition):

Status for week ending 04/01/2019:

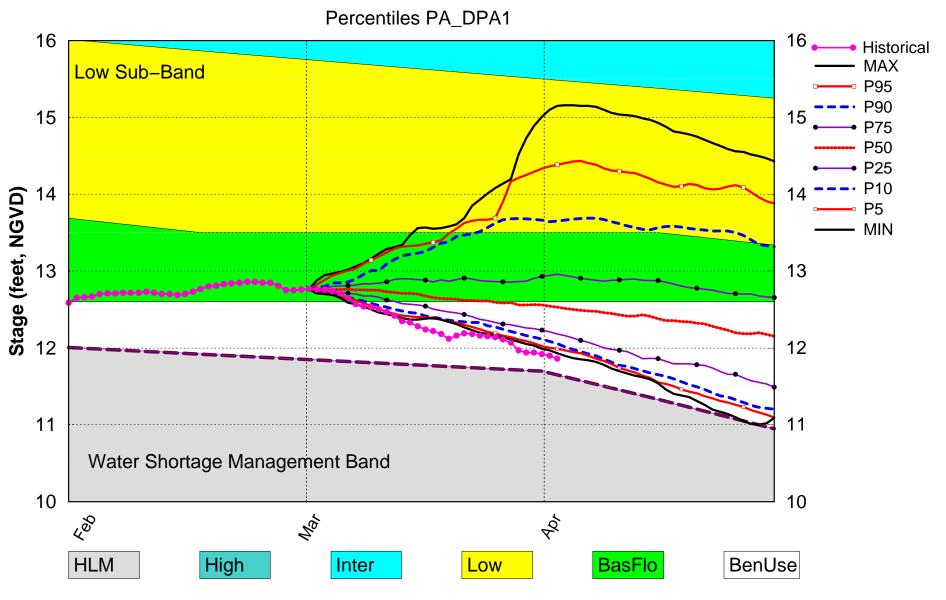
District wide, Raindar rainfall was 0.08 inches for the week. Lake stage on 04/01/2019 was 11.90ft, NGVD, down 0.24 ft from last week .The updated March 2019 SFWMM Dynamic Position Analysis percentile graph for Lake Okeechobee show that the current lake stage is in the Beneficial Use Sub-band. The LORS2008 Tributary Hydrologic Conditions (THC) are classified as **Normal.** The PDSI indicates normal conditions and the LONIN is dry. 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	Beneficial Use Sub-Band	Ι
	Palmer Index for LOK Tributary Conditions	-0.90 (Normal)	L
	CDC Procinitation Outlook	1 month: Above Normal	Ш
LOK	CPC Precipitation Outlook	3 months: Above Normal	П
	LOK Seasonal Net Inflow Outlook ENSO Forecast (positive)	2.34 ft (Normal to Extremely Wet)	L
	LOK Multi-Seasonal Net Inflow Outlook	2.91 ft (Normal)	M
	ENSO Forecast (positive) WCA 1: Site 1-7, Site 1-8T, & Site 1- 9 Average	Above Line 1 (16.23 ft)	L
WCAs	WCA 2A: Site 2-17 HW	Above Line 1 (12.18 ft)	L
	WCA-3A: 3 Station Average (Site 63, 64 and 65)	Above Line 1 (9.46 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

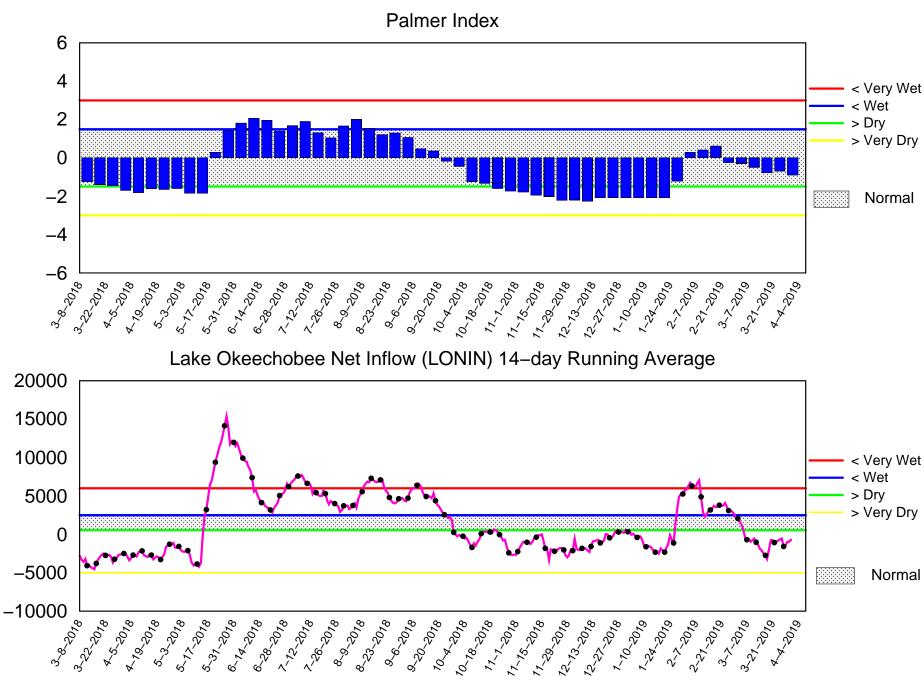
Note: The water supply risk classification based on the Palmer index, as well as the LOK seasonal and multi-seasonal net inflow outlooks use slightly different classification intervals than those used by the 2008-LORS.

Lake Okeechobee SFWMM Mar 2019 Position Analysis



(See assumptions on the Position Analysis Results website)

Tributary Basin Condition Indicators as of April 1 2019

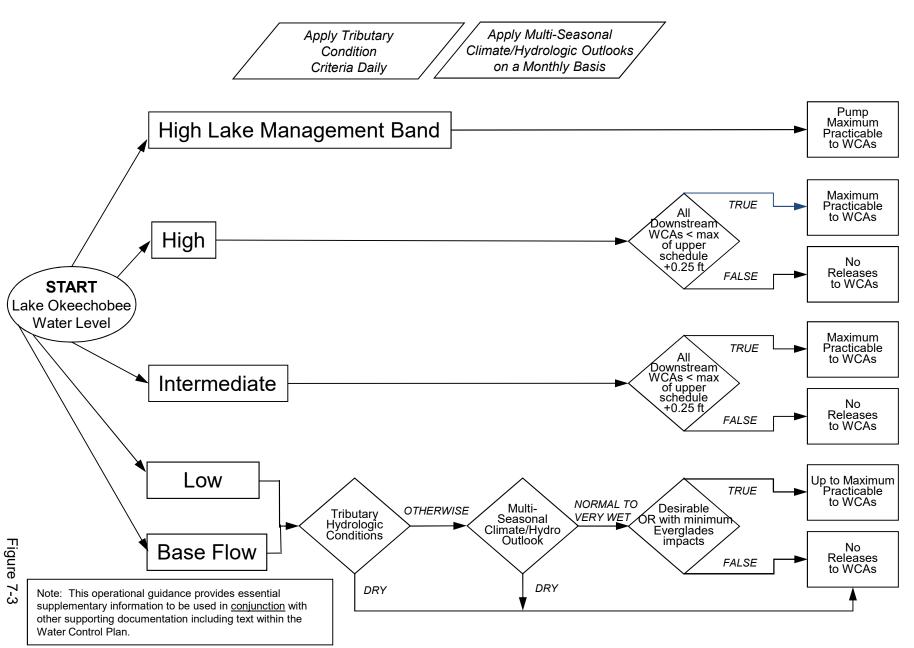


Mon Apr 01 22:52:02 EDT 2019

Flow (cfs)

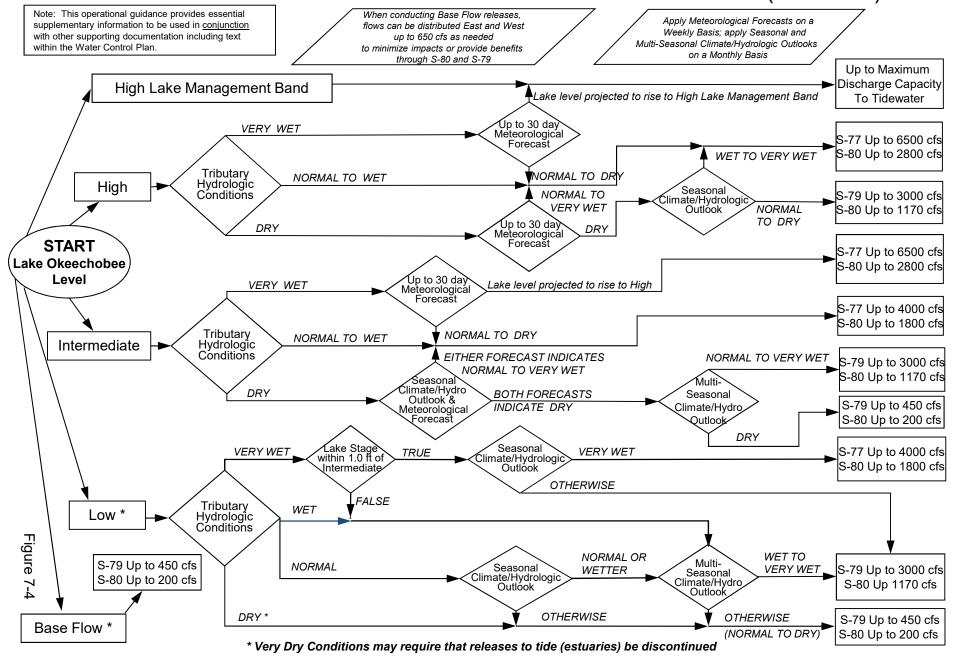
2008 LORS

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

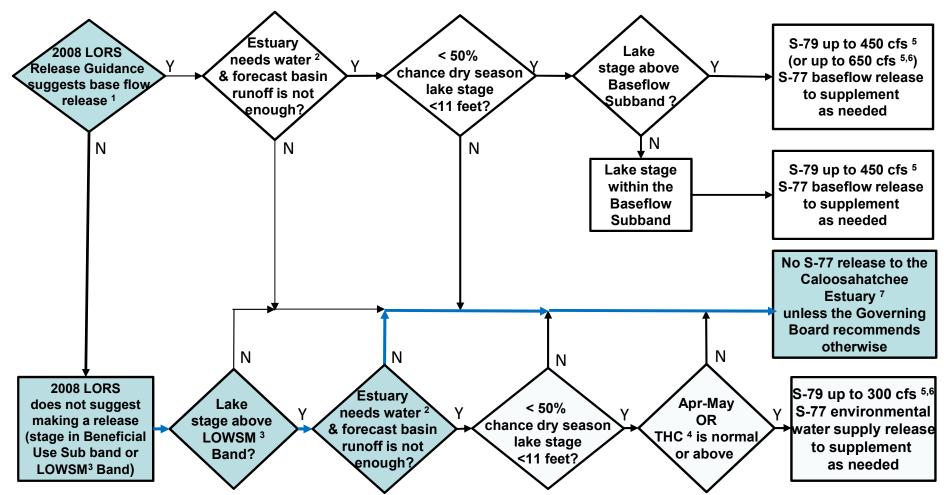


2008 LORS

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.

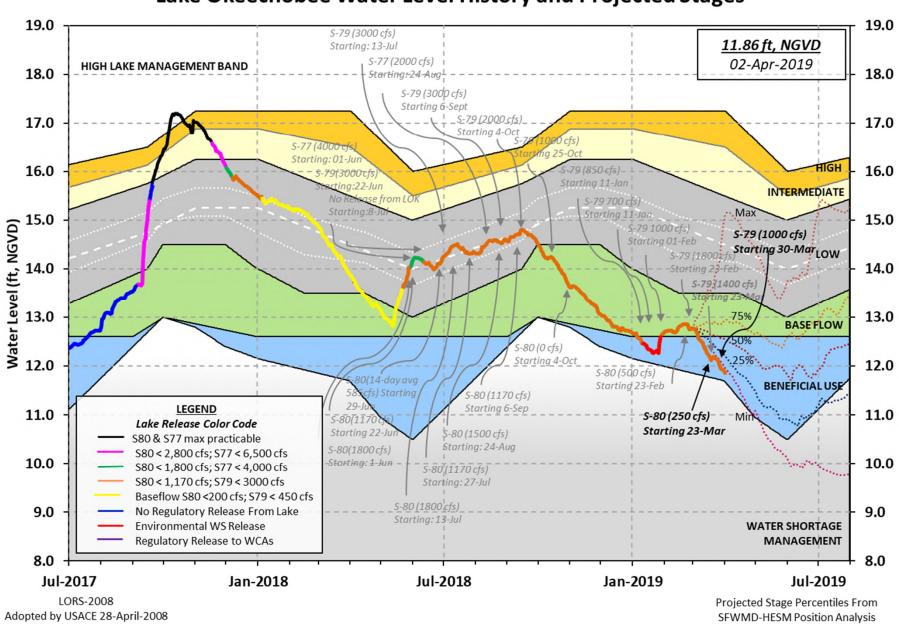
⁴Tributary Hydrologic Condition (THC) is based on classification of Lake Okeechobee Net Inflow and Palmer Index.

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 31 MAR 2019

Okeechobee Lake Regulati	(ft-NGVD)) (ft-NGV	D) (ft-NGVD)	
*Okeechobee Lake Eleva Bottom of High Lake Mn Currently in Operation	gmt= 17.25 Top	of Water Sh		fficial Elv) .70
Simulated Average LORS Difference from Averag				
31MAR (1965-2007) Peri Difference from POR Av		rage 14. -2.4		
Today Lake Okeechobee stations	elevation is dete	ermined fro	m the 4 Int &	4 Edge
++Navigation Depth (Ba 5.84'	sed on 2007 Chan	nel Conditi	on Survey) Ro	ute 1 ÷
++Navigation Depth (Ba	sed on 2008 Chan	nel Conditi	on Survey) Ro	ute 2 ÷
Bridge Clearance = 51.	92'			
4 Interior and 4 Edge Ok	eechobee Lake Ave	erage (Avg-	Daily values)	:
L001 L005 L006 L 11.91 11.96 11.92 1			S133 11.86	
*Combination Okeechobee	Avg-Daily Lake	_	11.90 (*See Note)	
_				
Okeechobee Inflows (cfs)		0.00		•
S65E 0 S154 0	S65EX1 S191	390	Fisheating C S135 Pumps	r 9 0
	S191 S133 Pumps	0		0
S84X 0	S133 Fumps S127 Pumps	0	S2 Pumps	0
S71 0	S127 Fumps S129 Pumps	0	S3 Pumps S4 Pumps	0
S72 0	S131 Pumps	0	C5	0
Total Inflows: 399	SISI I ampo	O		O
Okeechobee Outflows (cfs):			
S135 Culverts 0	S354	509	S77	1476
S127 Culverts 0	S351	623	S308	0
S129 Culverts 0	S352	544		
S131 Culverts 0 Total Outflows: 3107	L8 Canal Pt	-45		

	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 S	horo	(I) see n	ote at	bott	com				
S133 Pumps S193:		11.51	0	0	0	0	0	0	(cfs)	
S191:	16.81	11.51	0	0.0	0.0	0.0				
S135 Pumps	: 12.16	11.68	0	0	0	0	0		(cfs)	
S135 Culve	rts:		0	0.0	0.0					
North West S	homo									
S65E:	20.95	11.13	0	0.0	0.0	0 0	0.0	0 0	0.0	
S65EX1:		11.13	390	0.0	0.0	0.0	0.0	0.0	0.0	
S127 Pumps		11.79	0	0	0	0	0	0	(cfs)	
S127 Culve			0	0.0					(/	
0100 D	10.00	10 10	0	0	0	0			, ,	
S129 Pumps S129 Culve	: 12.80	12.13	0	0.0	0	0			(cfs)	
SIZ9 Culve	IL:		U	0.0						
S131 Pumps	: 12.74	11.76	0	0	0				(cfs)	
S131 Culve	rt:		0							
ni shaaki sa	Q1-									
Fisheating nr Palmd		28.46	9							
nr Lakep		20.40	,							
C5:	010	-NR-	0	-NF	RNI	RNE	<−			
South Shore	11 00	11 00	0	^	^	0			, ,	
-	11.86	11.98	0	0					(cfs)	
S169: S310:	12.02 11.91	11.97	92 138	4.9	4.9	4.9				
2210.	11.71		100							

```
S351 and S352 Temporary Pumps/S354 Spillway
 S351:
           11.08
                   -NR-
                           623 -NR--NR--NR--NR--NR-
 S352:
           11.18
                           544 -NR--NR--NR-
                   12.19
 S354:
           11.49
                           509 -NR--NR--NR-
Caloosahatchee River (S77, S78, S79)
 S47B: 11.66 10.82
                                 0.0 0.0
                   10.87 -34 6.5
 S47D:
           10.87
 S77:
   Spillway and Sector Preferred Flow:
           11.73 10.74 1474 0.0 4.0 4.0 4.0
                           2
   Flow Due to Lockages+:
 S78:
   Spillway and Sector Flow:
           10.65 3.08 1185 2.0 2.5 0.0 0.0
   Flow Due to Lockages+:
                            13
 S79:
   Spillway and Sector Flow:
            3.19 1.97 1564 1.0 1.0 1.0 1.0 1.0 1.0
0.0
            D Lockages+: 10
flow from S77 94%
(ppm) 62
   Flow Due to Lockages+:
   Percent of flow from S77
   Chloride
St. Lucie Canal (S308, S80)
 S308:
   Spillway and Sector Preferred Flow:
           11.89 11.58 0 0.0 0.0 0.0 0.0
   Flow Due to Lockages+:
      18.65 11.36 0 0.0 0.0
 S153:
 S80:
   Spillway and Sector Flow:
   - 11.68 0.82 0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Flow Due to Lockages+: 28
   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

_				Wi	.nd
- Daily Precipitation Totals Speed	1-Day	3-Day	7-Day	Directio	on
-1	(inches)	(inches)	(inches)	(Degø)	
(mph)				. 3 .	
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	0.00	0.00	246	1
S78:	0.00	0.00	0.00	275	1
S79:	3.93	3.93	3.93	270	0
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:	0.16	0.32	0.32	302	4
S80:	0.17	0.23	0.34	300	5
Okeechobee Average	0.08	0.02	0.02		
(Sites S78, S79 and	S80 not inc	luded)			
Oke Nexrad Basin Avg	0.02	0.08	0.08		

Okeechobee Lake Elevations 31MAR19	31 MAR 2019	11.90 Differ	rence from
·	30 MAR 2019	11.92	0.02
31MAR19 - 1 Day =	30 MAR 2019		0.02
31MAR19 -2 Days =	29 MAR 2019	11.94	0.04
31MAR19 - 3 Days =	28 MAR 2019	11.94	0.04
31MAR19 - 4 Days =	27 MAR 2019	11.97	0.07
31MAR19 -5 Days =	26 MAR 2019	12.07	0.17
31MAR19 -6 Days =	25 MAR 2019	12.11	0.21
31MAR19 -7 Days =	24 MAR 2019	12.14	0.24
31MAR19 - 30 Days =	01 MAR 2019	12.76	0.86
31MAR19 -1 Year =	31 MAR 2018	13.87	1.97
31MAR19 - 2 Year =	31 MAR 2017	-NR-	-NR-

Long Term Mean 30day Avearge ET for Lake Alfred (Inches) = 3.68

31MAR19 Today =	31 MAR 2019	-677 MON	-480
31MAR19 - 1 Day =	30 MAR 2019	-942 SUN	-849
31MAR19 -2 Days =	29 MAR 2019	-1001 SAT	3056
31MAR19 -3 Days =	28 MAR 2019	-1454 FRI	-1954
	27 MAR 2019		-14073
	26 MAR 2019		-2627
	25 MAR 2019		-952
	24 MAR 2019		1758
31MAR19 -8 Days =	23 MAR 2019	-876 SUN	917
31MAR19 - 9 Days =	22 MAR 2019	-1023 SAT	-1980
31MAR19 - 10 Days =	21 MAR 2019	-691 FRI	-1077
31MAR19 -8 Days = 31MAR19 -9 Days = 31MAR19 -10 Days = 31MAR19 -11 Days =	20 MAR 2019	-678 THU	7228
31MAR19 -12 Days =	19 MAR 2019	-1946 WED	9688
31MAR19 -13 Days =	18 MAR 2019	-3163 TUE	-8130
		previous 14 days	Avg-Daily Flow
31MAR19 Today=	31 MAR 2019		0
	30 MAR 2019		0
31MAR19 -2 Days =			0
	28 MAR 2019		0
31MAR19 - 4 Davs =	27 MAR 2019	15 THU	0
31MAR19 -5 Days = 31MAR19 -6 Days = 31MAR19 -7 Days = 31MAR19 -8 Days = 31MAR19 -9 Days =	26 MAR 2019	39 WED	0
31MAR19 -6 Days =	25 MAR 2019	70 TUE	0
31MAR19 -7 Davs =	24 MAR 2019	99 MON	0
31MAR19 -8 Davs =	23 MAR 2019	129 SUN	0
31MAR19 -9 Davs =	22 MAR 2019	158 SAT	0
31MAR19 -10 Days =	21 MAR 2019	188 FRI	0
31MAR19 -11 Days =			0
31MAR19 -12 Days =			0
31MAR19 -13 Days =	18 MAR 2019	385 TUE	0
_	S65EX1		
		previous 14 days	
31MAR19 Today=			390
	30 MAR 2019		449
31MAR19 -2 Days =	29 MAR 2019		422
31MAR19 -3 Days =	28 MAR 2019	724 FRI	432
31MAR19 -4 Days =	27 MAR 2019 26 MAR 2019 25 MAR 2019	725 THU	528
31MAR19 -5 Days =	26 MAR 2019	696 WED	675
31MAR19 - 6 Days =	25 MAR 2019	649 TUE	872
31MAR19 - 7 Days =		596 MON	966
31MAR19 -8 Days =	23 MAR 2019	529 SUN	992
31MAR19 - 9 Days =			970
31MAR19 - 10 Days =			893
31MAR19 - 11 Days =	20 MAR 2019	423 THU	871
31MAR19 -12 Days =		389 WED	816
31MAR19 -13 Days =	18 MAR 2019	351 TUE	508

DATE 31 MAR 2019 30 MAR 2019 29 MAR 2019 28 MAR 2019 27 MAR 2019 26 MAR 2019 25 MAR 2019 24 MAR 2019 23 MAR 2019 21 MAR 2019 21 MAR 2019 20 MAR 2019 19 MAR 2019 18 MAR 2019	1736 1916 2540 2832 3184 2990 1816 126 251 1320 3404	Below S-77 Discharge (ALL-DAY) (AC-FT) 2524 1806 1566 1798 2461 3245 4162 3821 1816 259 634 1567 3908 3784	S-78 Discharge (ALL DAY) (AC-FT) 2425 1520 1088 1280 1324 2260 3387 3441 1862 762 1899 2098 2974 3765	S-79 Discharge (ALL DAY) (AC-FT) 3148 1723 745 1596 2447 3128 4139 4722 2882 1814 2708 4762 4815 5138	
	S-310	s-351	S-352	S-354	L8 Canal Pt
	Discharge	Discharge	=	Discharge	Discharge
	(ALL DAY)	(ALL DAY)	(ALL DAY)	(ALL DAY)	(ALL DAY)
DATE 31 MAR 2019	(AC-FT) 273	(AC-FT) 1235	(AC-FT) 1078	(AC-FT) 765	(AC-FT) -90
30 MAR 2019		1408	906	882	-115
29 MAR 2019		1434	1027	1041	-100
28 MAR 2019	340	1663	1322	1535	-0
27 MAR 2019	451	2789	1414	2764	173
26 MAR 2019	204	2614	1498	2842	87
25 MAR 2019	161	1724	1050	1801	- 67
24 MAR 2019 23 MAR 2019	188 152	557 633	701 703	1598 1713	-77 26
22 MAR 2019	117	1082	693	1529	-101
21 MAR 2019	-69	18	0	1154	-20
20 MAR 2019		351	191	807	-34
19 MAR 2019		181	124	248	-160
18 MAR 2019	186	791	802	1134	-0
	S-308	Below S-308	s-80		
	Discharge	Discharge	Discharge	!	
	(ALL DAY)	(ALL-DAY)	(ALL-DAY)		
DATE	(AC-FT)	(AC-FT)	(AC-FT)		
31 MAR 2019	1	-240	55 73		
30 MAR 2019 29 MAR 2019	-11 916	254 552	73 140		
28 MAR 2019	786	379	250		
27 MAR 2019	887	487	424		
26 MAR 2019	494	542	483		
25 MAR 2019	236	424	528		
24 MAR 2019	-113	569	448		
23 MAR 2019 22 MAR 2019	-49 43	118 138	445 456		
21 MAR 2019	- 1	266	509		
20 MAR 2019	115	111	536		
19 MAR 2019	-61	43	144		
18 MAR 2019	411	391	446		

*** 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 \min 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

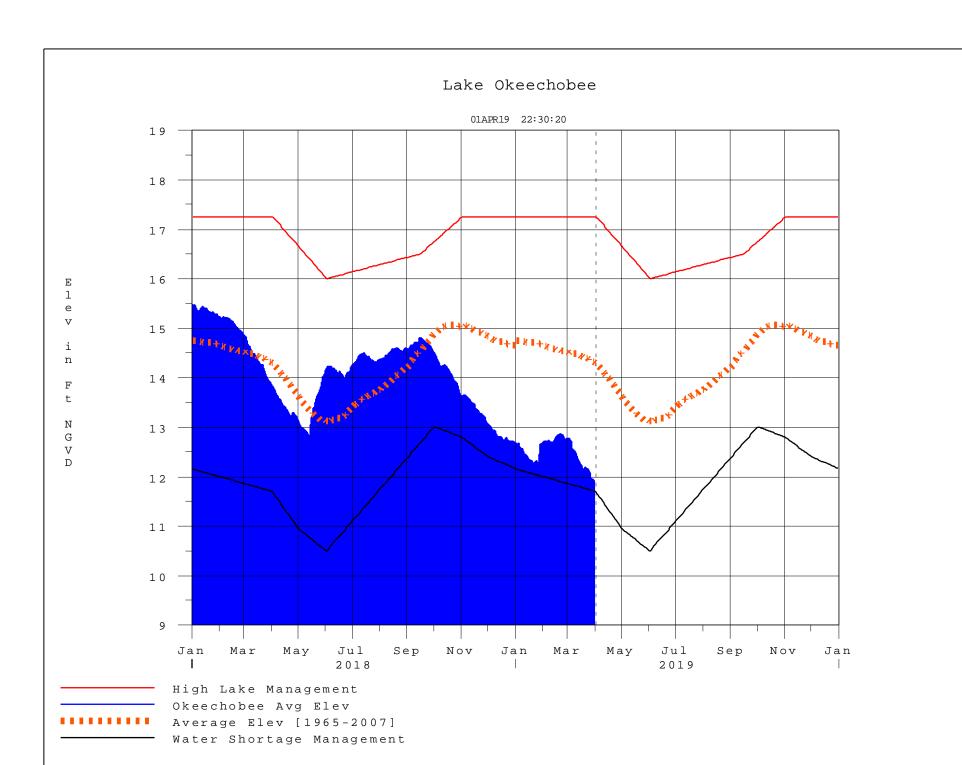
++ For more information see the Jacksonville District Navigation website at http://www.saj.usace.army.mil/

\$ For information regarding Lake Okeechobee Service Area water restrictions

please refer to www.sfwmd.gov

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Report Generated 01APR2019 @ 22:38 ** 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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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