

APPENDIX D

KISSIMMEE BASIN 2015-2016 DRY SEASON STANDING RECOMMENDATIONS

PLANNED TEMPORARY DEVIATION 1981 LAKE KISSIMMEE, CRYPRESS, AND HATCHINEHA (KCH)

INTERIM REGULATION SCHEDULE

OSCEOLA AND POLK COUNTIES, FLORIDA

STANDING RECOMMENDATIONS FOR KISSIMMEE BASIN STRUCTURES

2015-2016 DRY SEASON (Remainder of Window A and Window B)

The following recommendations provide comprehensive operational guidance for the 2015-2016 dry season for S65C, S65A, S65, S61, and S59. Structures not specified should be operated according to their respective regulation schedules and, as applicable, seasonal non-standard operations recommended by the District's Water Control Operations (WCO) section. The standing recommendations may be supplemented or superseded periodically by request from KB Operations (Steve Bousquin or David Anderson) after continued coordination with USFWS and FWC as seasonal conditions develop.

Seasonal operations are divided into two windows, Window A (June through January) and Window B (February through May) (Figure 1) to subdivide the year into the two major periods of dominant environmental operations: lake stage ascensions/floodplain discharge operations for S65 in the summer/fall/early winter (Window A); and fish and wildlife (F&W) lake recession operations/discharge recommendations in winter-spring (Window B).

Window A, Dry Season Portion (November 1, 2015– January 31, 2016)

S61 and S59

Lakes Toho (S61) and East Toho (S59)

No specific operations have been requested for the dry season portion of Window A (Nov 1-Jan 31) in Lakes Toho or East Toho. These lakes can be operated according to their respective regulation schedules and the non-standard operations required by WCO until the winter/spring recession lines are implemented, which depend on lake stages and desired recession rates. Lake recessions will not begin before January 31.

S65 and S65A

S65 Environmental (Zone B) Releases for KRRP from Kissimmee-Cypress-Hatchineha (KCH)

1. Figure 1 shows four discharge zones that specify the discharge to be made at S65/S65A depending on average lake stage in Lakes Kissimmee-Cypress-Hatchineha (KCH). The discharge zones and corresponding discharge magnitudes are as follows:
 - a) Zone B1 – discharge a minimum of 300 cfs (+/- 50 cfs)
 - b) Zone B2 – discharge a minimum of 1400 cfs
 - c) Zone B3 Buffer – discharge should ramp up between ~1400 cfs at the lower Zone B3 line and 3000 cfs at the schedule line (or non-standard WCO line) using the discharge increase rate limits given in Table 1
 - d) Zone A – discharge for flood control operations as determined by WCO.
2. Table 1 provides maximum limits on the rate of discharge increase or decrease as the KCH in-lake average lake stage moves from one zone to another, or as it changes within the Zone B3 Buffer. The limits on rates of increase and decrease in discharge shown in Table 1 are maxima; in practice rates should be as slow as possible.
3. If lake stage has entered or is likely to enter Zone A and flood control releases are imminent, consider the following:
 - a. During large events when in the Zone B Buffer zone, the rate of discharge increase may need to exceed the recommendations in Table 1. Changes should be assessed in real

time in consultation with KB Operations points of contact Steve Bousquin and David Anderson.

- b. Based on forecasts of large events, consider increasing discharge preemptively (before lake stage begins to rise).
- c. As needed, consider making use of regulatory operational flexibility to remain above the regulation line for up to two weeks to help avoid the need for sudden increases in discharge.

Objectives: Environmental objectives for the Kissimmee River in Window A include prolongation of floodplain hydration for recovery of long-hydroperiod marshes; increased contact time of water with vegetation and soils for reduction of nutrient loads to Lake Okeechobee; avoidance of recurring, rapid floodplain drydowns followed by stage reversals; control of dissolved oxygen levels; and mimicry of historic hydrologic conditions to the extent possible given available rainfall. Limitations on maximum rates of increase and decrease in discharge at S65 are intended to avoid excessively rapid increases and decreases in discharge (flashiness) during and following storm events or dry periods to ameliorate the detrimental effects of rapid changes in discharge to the KRRP, including impacts on wading bird foraging, declines in dissolved oxygen, and avoidance of excessive stage reversals on the Kissimmee River floodplain.

S65C

S65C Headwater Stage:

1. Table 3 provides guidelines for control of headwater stages at S65C for a range of discharges.
2. In general, the S65C stage transitions shown in Table 3 should be implemented so that the rate of change is distributed over a week. Currently we recommend changing S65C headwater stage at a rate of 1.0 ft/week.

Objectives: Allow stage in lower Pool BC to vary with upstream discharge while using operational flexibility to control river channel depth and water surface slope for DO operations, and to help control floodplain stage recession rates after high discharge events.

Window B (February 1 – May 31, 2016) (Lake Recessions Period)

S61 and S59

Dry season recessions for Lakes Toho (S61) and East Toho (S59):

1. Figure 2 shows projected stage recession lines for Lakes Toho and East Toho.
2. Limit stage reversals to a maximum of 0.5 ft as possible.
3. If there is a reliable forecast for rain, target recession rates may be exceeded to lower lake stage by 0.25 ft the day before the rain event.
4. Upon a stage reversal, USFWS/FFWCC will confer with District's KB Operations to discuss options if:
 - a. Stage reversals are expected to exceed 0.5 ft, or
 - b. Recovery is expected to exceed 7 days from the peak of reversal using the below criteria.

5. Following reversals, recovery to the currently established target recession line (“return rate”) should be as fast as possible with highest recession rates as soon as possible after the peak of the reversal and tapering as stages approach target recession lines, subject to maximum recession rates for returns from reversals as follows:
 - a. Up to 0.1 ft/day for up to 3 days (0.3 ft total), measured starting from the steepest part of the recovery line.
 - b. If stages still exceed the target recession line, reduce recession rate to 0.05 ft/day for up to an additional 4 days (0.2 ft).
 - c. If stages still exceed the target recession line, resume target recession rates (~0.02 ft/day) as possible until District KB Operations and WCO Operations staff can reconvene with USFWS/FFWCC to discuss options.
6. Discharge operations recommended to control stage recessions in these lakes must consider the effects on Kissimmee-Cypress-Hatchineha (KCH) and the resulting effects on discharge to the Kissimmee River through S65.

Objectives: Achieve May 31 regulation lows in Lakes Toho and East Toho while addressing recession criteria requested to enhance snail kite and fish/wildlife productivity, effects on stage in KCH, and effects on discharge to KRRP.

S65 and S65A

(S65/S65A) Environmental (Zone B) Releases for KRRP

**Recommendations for discharge to the Kissimmee River Restoration Project (KRRP) in general apply to S65A, which under some circumstances may be operated differently from S65.*

1. Follow the discharge zones in Figure 1 and limits on the rate of discharge increase/decrease in Table 1 until stage intercepts the F&W recession line, which begins on February 1. After stage intercepts the F&W line, use Table 2 to guide rates of change in discharge depending on departure from the target F&W recession line.
2. DRY FLOODPLAIN RULE (See Table 1). When the Kissimmee River floodplain is dry (>7 days at 300 cfs), increases above 1200 cfs should be made in consultation with LRE Operations (Steve Bousquin and David Anderson).

Objectives: Recommendations for discharge at S65/S65A are designed to provide appropriate levels and rates of change in discharge to the Kissimmee River while addressing requests for KCH F&W stage recessions starting in January-February, which are intended to achieve May 31 regulation lows with slower recession rates to enhance snail kite nesting and benefit other fish and wildlife in KCH. Goals of the discharge constraints include: maintaining minimum acceptable discharge and acceptable rates of change in discharge for KRRP after high discharge events and during dry periods, while allowing control of departures from requested recession lines in KCH to the extent feasible; avoiding stage reversals on the KRRP floodplain, which can disrupt wading bird foraging and nesting; and controlling dissolved oxygen in the Kissimmee River as needed.

S65 Environmental (Zone B) Releases for Dry Season Recession in Kissimmee-Cypress-Hatchineha (KCH)

1. Actual starting stage for the KCH F&W recession line will be determined by the stage at which the projected recession line is intersected.
2. Avoid stage reversals greater than **0.5** ft per event subject to constraints imposed by the guidelines for maximum Zone B rates of discharge increase for S65 as described in Table 1. Limit departures below the recession line to **0.3** ft as possible while following the discharge rate of change criteria in Table 1.
3. In cases where stage departures from the recession line cannot be controlled within the departure limits given above, use the higher rates of change in discharge provided in Table 2, which increase with greater stage departures. Beyond the departure limits shown, in extreme situations adaptive operations will be communicated following coordination with FWS/FWC.
4. In KCH, recession lines are used as approximate (not fixed) targets to allow the operational flexibility to address reversals and departures below the target line while following the constraints on discharge change indicated in Tables 1 and 2 to ameliorate negative impacts on KRRP.

Objectives: Achieve regulation lows in KCH on May 31 while addressing recession criteria to enhance snail kite and apple snail productivity as well as discharge concerns for the KRRP. Upon implementation of a F&W recession line, limitations on maximum rates of increase and decrease in discharge at S65 are intended to avoid excessively rapid increases and decreases in discharge (flashiness) during and following storm events or dry periods to ameliorate the detrimental effects of rapid changes in discharge to the KRRP, including impacts on wading bird foraging, declines in dissolved oxygen, and avoidance of excessive stage reversals on the Kissimmee River floodplain.

S65C

S65C Headwater Stage:

1. Table 3 provides guidelines for headwater stages at S65C for a range of discharges.
2. In general the stage transitions shown in Table 3 should be implemented so that the rate of change is distributed over a week. Currently we recommend changing headwater stage at a rate of 1.0 ft/week.

Objectives: Allow stage in lower Pool BC to vary with upstream discharge while using operational flexibility to control river channel depth and water surface slope for DO operations, and to control floodplain stage recession rates after high discharge events.

**Table 1. Discharge Rate of Change Limits for S65/S65A
(Rate limits apply only in Zone B)**

	Q (cfs)	Maximum rate of increase (cfs/day)	Maximum rate of decrease (cfs/day)
Zone B	0-300	50	-50
	300-1400	150*	-75
	1400-2500	300	-300
	2500-3000	1000	-1000
Zone A	No limits		

***DRY FLOODPLAIN RULE.** When the Kissimmee River floodplain is dry (>7 days at 300 cfs), increases above 1200 cfs should be made in consultation with LRE Operations (Steve Bousquin and David Anderson).

**Table 2. Maximum discharge rate of change limits for S65/S65A for use during departures after stage has intersected the KCH F&W recession line. These are maximum rates and should be implemented with discretion and as slowly as possible.
Rate limits apply only in Zone B**

		Departure (ft) above the F&W line				Departure (ft) below the F&W line				
		<= 0.5	> 0.5	> 0.75	> 1.0	>= -0.3	< -0.3	< -0.5	< -0.75	< -1.0
	Q (cfs)	Maximum rate of increase (cfs/day)				Maximum rate of decrease (cfs/day)				
Zone B	0-300	50	100	150	200	-50	-100	-150	-200	-250
	300-1400	150	300	450	600	-75	-150	-225	-300	-375
	1400-2500	300	600	800	800	-300	-600	-600	-600	-600
	2500-3000	1000	1000	1000	1000	-600	-600	-600	-600	-600
Zone A	No limits									

Table 3. Criteria for changes in S65C headwater stage.

1: Target maximum S65C HW stage of 35.4 ft when PC62* discharge is ≥ 1200 cfs; target minimum S65C HW stage of 33.0 ft when PC62 discharge is 300 cfs or lower.

2: For sustained increases or decreases in discharge between 300 cfs and 1200 cfs at PC62, in general raise or lower S65C HW stage at a maximum rate of 1 ft per week (distributed over the week) to approach target stages in the table below. Consult KB Ops for additional guidance as needed.

3: Following a rampdown from discharge >1200 cfs to 300 cfs at PC62, retain maximum S65C HW stage for 2 weeks before reducing S65C HW stage at a maximum rate of 1.0 feet per week (distributed over the week) to the minimum stage of 33 ft.

Discharge at PC62 (cfs)	Target S65C HW Stage (ft NGVD)
0-300	33
400	33.3
500	33.5
600	33.8
700	34.1
800	34.4
900	34.6
1000	34.9
1100	35.2
≥ 1200	35.4

*If PC62 is unavailable, use mean daily discharge at S65A.

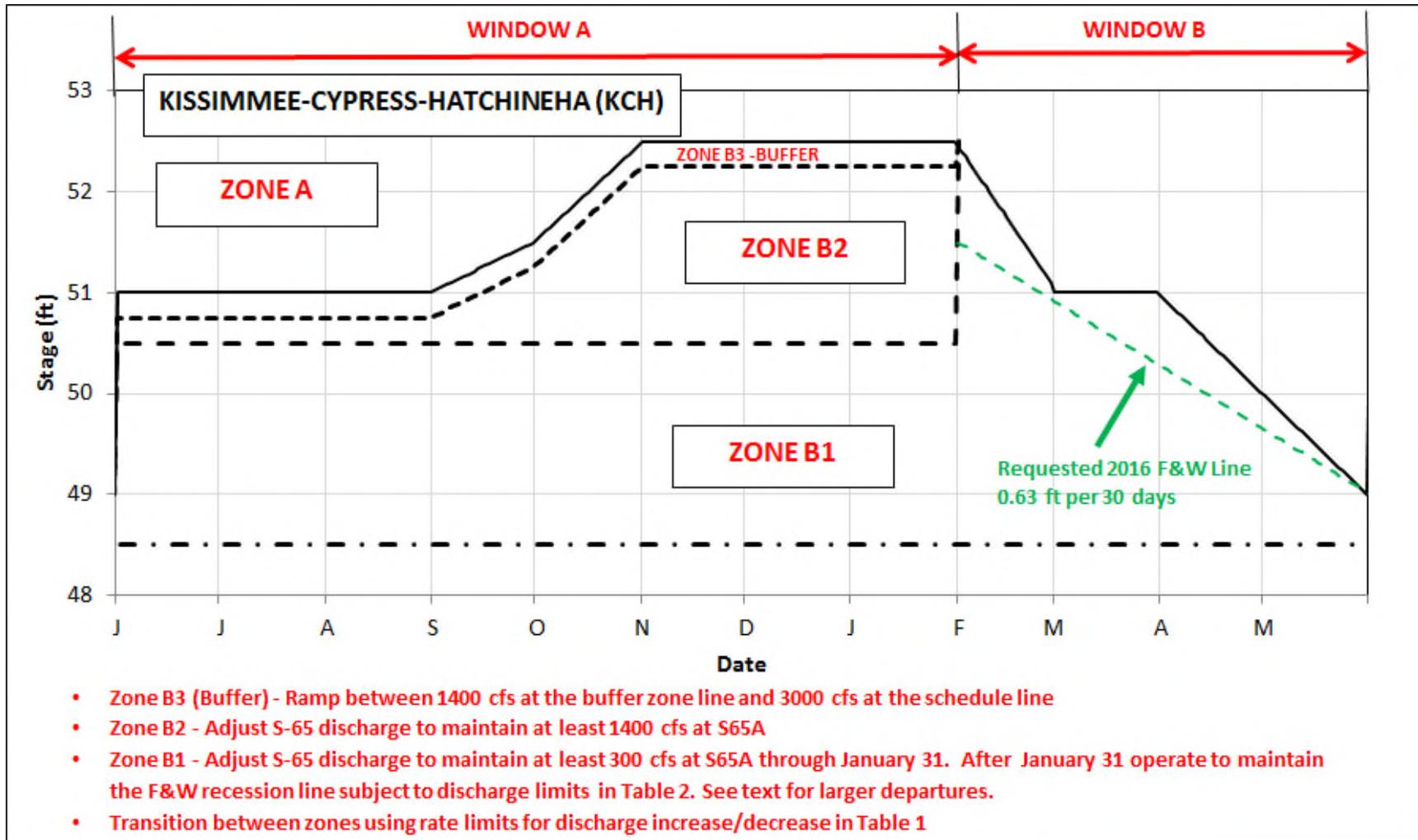


Figure 1. Discharge zones for Lakes Kissimmee, Cypress, and Hatchineha (S65) for Window A. Use Table 2 discharge guidelines after the recession line is intercepted or after Feb 1.

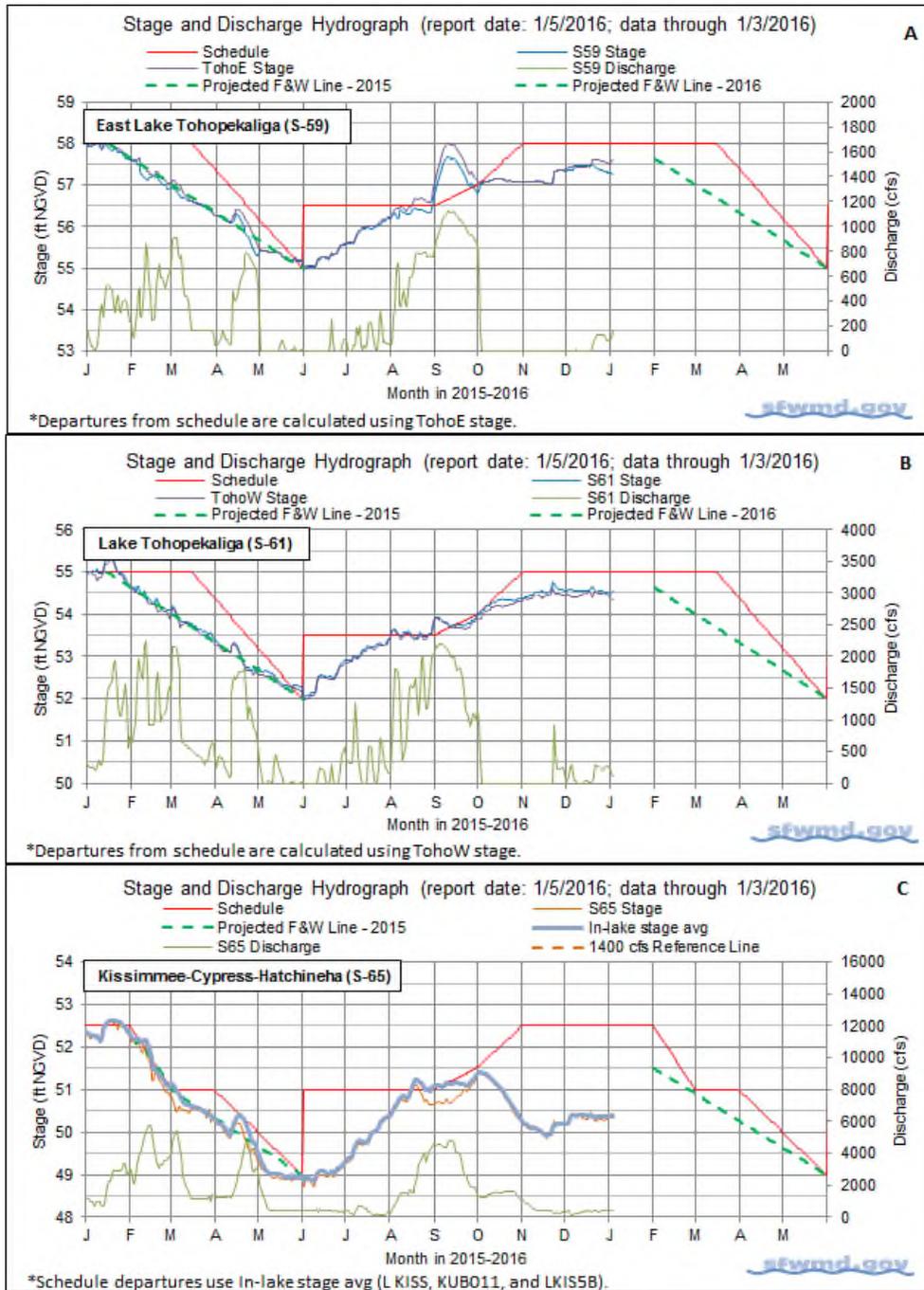


Figure 2. Graphs of requested 2016 Fish & Wildlife (F&W) recession lines for East Lake Toho (A), Lake Toho (B), and KCH (C). The F&W lines have slopes of 0.66 ft per 30 days in East Lake Toho and Lake Toho and 0.63 ft per 30 days in KCH. The recession lines may change depending on actual lake stages on Feb. 1. Updated hydrographs can be viewed in the weekly Ecological Conditions Report at <http://www.sfwmd.gov/portal/page/portal/xweb%20-%20release%202/operational%20planning>.