

Lake Okeechobee Stage Envelope Performance Measure Comment Response Matrix for RECOVER-wide, Agency and public review December 5, 2019 – January 3, 2020.

LETTER/EMAIL	Date Received	AGENCY/PUBLIC COMMENT	RECOVER RESPONSE
Federal			
United States Environmental Protection Agency (EPA)			
Matt Harwell-1	12/6/19	Is there a need to include some cross-walk/anchor to Lake O's formal MFL? Wasn't sure how RECOVER water level performance measures as a whole include context/reference back to existing MFLs.	RECOVER has always been cautious not to mingle restoration targets with MFL's, this causes confusion among stakeholders. Restoration targets are a much higher standard ecologically to meet than an MFL which is designed to just protect from significant harm.
Matt Harwell-2	12/6/19	Similar question about the relationship between this and the stoplight indicator? Crosswalk to the indicator, reference the original paper for that indicator? How do other RECOVER performance measures approach connections between related PMs and stoplight indicators?	We added a reference regarding giant bulrush stage requirements which came from the 2009 stoplight article. Growing conditions for SAV in this PM are assessed only through lake stage, rather than stage and observed acreages in the stoplight indicator. However, Chara was used as indicative of growing conditions, as it was in the stoplight indicator paper.
State			
Florida Fish and Wildlife Conservation Commission (FWC)			
FWC-1	12/20/19	Lake Okeechobee is a vibrant ecosystem supporting numerous fish and wildlife populations, including world-renowned sport fisheries, waterfowl, and federally and state-listed species. The proposed new target stage envelope will improve alignment with the FWC's	Thanks for the comment

		recommended 12-15.5-ft envelope for optimum fish and wildlife conditions (FWC 2003) on the lower end, which will be ecologically beneficial for the growth of submerged and emergent aquatic vegetation, nutrient absorption, and resilience to vegetation damage resulting from high water (>15.5-ft) events.	
FWC-2	12/20/19	The revised scoring metrics, including the penalty framework for extreme highs (>17-ft) and lows (<10-ft), will provide increased penalties for the known ecologically-damaging high and low conditions on Lake Okeechobee (FWC 2003).	Thanks for the comment
FWC-3	12/20/19	FWC staff agree that the adaptive framework to implement a separate Recovery target stage envelope following years where high-water conditions (>17-ft at any time of the year or when the 30-day minimum lake stage between June and July is >13-ft) occur should provide greater recovery and long-term sustainability of the Lake Okeechobee ecosystem.	Thanks for the comment
FWC-4	12/20/19	FWC staff appreciate the opportunity to participate in the review and support the proposed Draft RECOVER 2019 Lake Okeechobee Stage Envelope Performance Measure in its current form. This Performance Measure acknowledges the ecological benefits of replicating natural annual and seasonal stage variation and the adaptive approach for implementing recovery conditions.	Thanks for the comment
Florida Inland Navigation District (FIND)			
FIND-1	12/20/19	As restoration of the Everglades progresses, FIND requests that the USACE continue to recognize that any performance measures for Lake Okeechobee restoration	Competing needs such as water supply, flood control and navigation are all considered as part of the CERP planning process or for LOSOM

		<p>projects must also recognize their impact to continued safe navigation of the Okeechobee Waterway (OWW). The USACE is tasked with managing both water levels AND navigation. The OWW is an important marine highway which provides the only cross Florida access for both commercial and recreational vessels, as well as a vital life/property safety hurricane evacuation route for vessels.</p>	<p>as part of developing the new regulation schedule. Ecological performance measures are designed specifically to address the health of a given region or indicator species.</p>
FIND-2	12/20/19	<p>Lake level has a significant economic and safety impact upon the commercial and recreational marine industry of Florida. At the congressionally-authorized navigation maintenance depth, a minimum Lake level of 12 feet provides a maximum recommended draft of 6 feet along Route 1, and 4 feet along Route 2 (Rim Canal). When lake levels are allowed to drop below 12 feet, navigation on the federal waterway becomes highly constricted, commercial and recreational vessel traffic is greatly reduced, and the use of the OWW as a hurricane evacuation route is severely compromised. Lake levels below 12 feet are unacceptable for navigation, and even more so during peak hurricane season.</p>	<p>Competing needs such as water supply, flood control and navigation are all considered as part of the CERP planning process or for LOSOM as part of developing the new regulation schedule. Ecological performance measures are designed specifically to address the health of a given region or indicator species.</p>
FIND-3	12/20/19	<p>As the Army Corps of Engineers reviews the Lake Okeechobee Performance Measures Lake Stage, FIND requests that you give strong consideration to maintaining lake levels at or above 12 feet which maintains safe navigation and recreation across and around Lake Okeechobee.</p>	<p>Competing needs such as water supply, flood control and navigation are all considered as part of the CERP planning process or for LOSOM as part of developing the new regulation schedule. Ecological performance measures are designed specifically to address the health of a given region or indicator species.</p>
<p>Florida Department of Agriculture & Consumer Services (FDACS)</p>			

FDACS-1	1/3/20	<p>1) The current RECOVER process for the development, review and acceptance of performance measures is not well understood by the public and lacks notification and accessibility for the public. RECOVER has traditionally considered them short technical documents serving a very focused purpose as an ideal desired restoration condition to either evaluate planning scenarios or use real world data to assess existing environmental conditions. While the purpose of a PM may stay the same, a broader view of the importance and interest of these technical scientific documents to a larger audience is needed, particularly when dealing with high profile planning efforts such as the Lake Okeechobee System Operating Manual (LOSOM). Recommend future technical work on this PM incorporate public workshops and all meetings of RECOVER that include the LO Stage Envelope PM Revision be clearly noticed to the public. The current RECOVER process includes final acceptance of a proposed PM by the RECOVER Executive Committee (REC). The proposed final version of the LO Stage Envelope PM should be available to the public with appropriate review time with the venue of the REC meeting addressing PM final acceptance adequate to accommodate attendance by all interested parties.</p>	<p>Thank you for the comment, we will try to incorporate your suggestions into the process in the future. During the LOSOM process there are many workshops and places for public input that we hope you will take advantage of.</p>
FDACS-2	1/3/20	<p>2) The development of a RECOVER PM has often been accomplished by a relatively small group of scientists without the benefit of opportunities for broader input before it reaches what could be considered a final draft. There are understandable reasons why this has been the model for development in many cases. However, it limits input and discussion of the science and evaluation</p>	<p>Thank you for the comment, we will try to incorporate your suggestions into the process in the future. During the LOSOM process there are many workshops and places for public input that we hope you will take advantage of.</p>

		methodologies at the earlier stages where it would be most valuable and productive. Recommend outreach or notification to interested parties and the public at large for potential working group participants and workshops during earlier phases of PM development such as is occurring for the Northern Estuaries Salinity Performance being led by the RECOVER Northern Estuaries Team.	
FDACS-3	1/3/20	3) Recommend adding a "Purpose" section to the beginning of the RECOVER PM documentation providing additional program context and information on the use of PMs as tools to evaluate planning scenarios and assess existing environmental conditions. LO Stage Envelope presentations and introductory material have included information that would be useful to reviewers. Information associated with but not included in the PM document attempts to clarify that the PM target is an idealized version of current LO stage based solely upon the health of animals and plants within Lake Okeechobee for comparison to model results and data collected. It has been developed with a narrow focus, not a proposed operational plan, and not intended to negate the cycle of hydrological variability that results in highs and lows outside of the LO Stage Envelope. Providing this information in the document itself could alleviate some of the concerns and temper some of the expectations that might be associated with a PM.	Thank you for the comment, we will try to incorporate your suggestions into the process in the future. During the LOSOM process there are many workshops and places for public input that we hope you will take advantage of.
FDACS-4	1/3/20	4) Consider the elimination of phrases like "penalty points or penalty score". If keeping "penalty" as a qualifier is preferred, provide references to other PMs where it was used and the justification for its use. When the goal is zero and point accrual is the evaluation methodology, "points	The term penalty was removed throughout as suggested.

		or score" by themselves should serve the purpose to produce a quantifiable result.	
FDACS-5	1/3/20	5) Page 4 line 130, Page 12 line 276 and page 14 lines 338 – 351 Recommend that the same term be used if there is no distinction between a panel member and a working group member or an explanation about the subset or different members if there is a distinction.	Revised throughout.
FDACS-6	1/3/20	6) Page 3 - lines 110 to 125 Figures 1, 2 and 3 Recommend further review and discussion regarding the use of a 30-day minimum lake stage of 13 ft NGVD during June and July as the criteria for a shift to a Recovery Stage Envelope. The duration of low stages for a minimum amount of time in June and July play an important role in the evaluation outcome of this PM as described for shifts between Normal and Recovery years in Section 4.0 Evaluation Application. Figure 3 shows that none of the four lowest non-hurricane Chara years reached as low as 13 ft NGVD but 2 of the 4 were near or above 14 ft NGVD for almost all of June and July and the other 2 of the 4 were more at or above 15 ft NGVD for almost all of June and July. What percentage of variation was explained by a 14 ft or 13.5 ft NGVD (30 d Jun/Jul min) compared to the 71 % variation explained by the 13 ft (30d Jun/Jul min)? There may be a justifiable basis for increasing the 30-day minimum threshold which would in tum lead to modifications in the 4.1 Evaluation Protocol Sub-Section.	Added more discussion regarding the 30-day criteria. Note that while there were gaps between years with a min of 13 and a min of 14, there were minimal coverages near the 13 as well, suggesting the threshold lies closer to 13 than 14.
FDACS-7	1/3/20	7) Page 5, Figure 1 -	Fixed the error, which was meant to include 2010 in the blue box.

		Confirm the placement of the year 2010 outside of Figure 1 's blue dashed box was intended. Otherwise, include 2010 within the blue dashed box.	
FDACS-8	1/3/20	<p>8) Page 7 - lines 180 - 184 - CERP Hypothesis</p> <p>Clarify how the revised hypothesis of reducing the main stage envelope by 0.5 feet and expanding this with "and providing recovery years after high-water events of stages between 14.5 ft in the winter to near 11.5 feet in the summer" was developed and accepted for use in the PM. Please provide background information on this process.</p>	<p>The earlier version modified the original CERP hypothesis simply to avoid confusing readers that it was a reference to specific, earlier, CERP work. We left the hypothesis alone in the latest version to clarify that is simply a reference to original documents. We also added more information on tradeoffs between high and low stages, and how specific indicators may respond to different stages. For example, the foraging requirements of overwintering wading birds informed the target of 14.5 feet in January, and the bottom target allows drying of the marsh to promote oxidation of muck and subsequent emergent vegetation recovery, SAV recovery, etc.</p>
FDACS-9	1/3/20	<p>9) Pages 6 & 7 - Overall Comment</p> <p>Lake stage is highly correlated with other variables related to climatological events, inputs and disturbances and does not exist and is not appropriate as an independent, stand alone variable determining ecological health. While increased time in the ecological envelope should be beneficial for Lake ecology, there are many uncertainties about attaining the changes listed. The document does contain Sub-section 4.1 Uncertainty but some note on the use of hypothesis and uncertainty in the scientific basis could be informative.</p>	<p>It is a given that many factors drive lake health, but this PM is designed to evaluate modeled stage outputs through the lens of lake ecology. In the real world, multiple parameters are used to asses lake ecological condition, as was done in the 2019 SSR... the results of which helped drive this update effort and is now explained in the latest version of this doc.</p>

FDACS-10	1/3/20	<p>10) Page 8 - The use of a Recovery Year in the Evaluation Protocol</p> <p>It appears the use of a Recovery year could be problematic given the criteria for shifts between Normal and Recovery Years described in the evaluation protocol. Below is a list of concerns:</p>	<p>Thank you for your comment. See responses to specific concerns below.</p>
FDACS-11	1/3/20	<p>a) The criteria is highly stringent and restrictive regarding use of the > 17.00 feet stage at a daily time step to trigger a switch from Normal to the Recovery Stage Envelope and the use of no stage > 16.00 at a daily time step needed to shift from Recovery back to a Normal Stage Envelope. Recommend a buffer zone or/and a duration at these critical stages so one day in the calendar year at 17.01 or 16.01 does not result in an out sized impact in an evaluation exercise. Flexibility is needed to allow stages to normalize depending on the circumstances.</p>	<p>17 ft as an extreme high is already acting as a "buffer". By the time the lake reaches 17ft and recedes back below 16 ft again, it has likely been above 16ft for an extended period of time, so harm has occurred. The same can be said for the 16 ft threshold. At 16 ft, the shallowest part of the marsh has 1 foot of water and most SAV areas have 4-7 feet of water, which would seriously stress or completely shade out recovering populations. Further, whether a buffer or duration is added, there will still be "hard" boundaries that would trigger a switch between envelope targets. These are evaluation tools intended to help discern effects of different operations on lake ecology and are not intended as management tools. Additionally, when applying these tools to evaluate alternatives, we assess why scores vary and whether they are a result of minor differences in stage along a threshold, etc. We clarified in the text that specific thresholds are necessary for evaluating model outputs, but if they were used for management decisions</p>

			there would need to be ecological monitoring to verify actual state of lake indicators like SAV.
FDACS-12	1/3/20	b) It is not clear if the shift from Normal to Recovery requires both conditions listed or just one.	Clarified that it could be either.
FDACS-13	1/3/20	c) Recommend the 30-day minimum stage in June and July used in the criteria for a shift from the Normal Stage Envelope to the Recovery Stage Envelope be revisited to determine if 13 ft is the correct threshold or whether a stage closer to 14 ft is more applicable. See comment 6.	We revisited the analyses and found the 13 ft threshold more appropriate. Added additional information re the importance of lower stages to species like bulrush, where the Stop-light indicators suggest only acceptable, slow growth at 13 ft but optimal conditions between 11-12. Note that while there were gaps between years with a min of 13 and a min of 14, there were minimal coverages near the 13 as well, suggesting the threshold lies closer to 13 than 14. We added text in the document regarding the considerable variability in coverage of <i>Chara</i> at minimum stages between 12-13, and how antecedent conditions play a role in that variation.
FDACS-14	1/3/20	d) Recommend providing more information about the scientific basis for a shift from Recovery to Normal. The shift from Normal to Recovery appears based on the extreme high water stage criteria and the correlations and regressions described on page 3. Is there a similar basis for a Recovery to Normal shift? Without additional information, it is not clear how this criteria is balanced with the possibility of detrimental prolonged low Lake stages, particularly when combined with the additional	Added information from 2019 SAV recovery to an Appendix to clarify when stages are "low enough for long enough". The criteria regarding whether stages exceed 16 ft following low stages incorporates probable ascension rates, water depths, and light levels at elevations where SAV would have recovered during the period of lower stages.

		criteria of not exceeding a maximum Lake stage of 16.00 ft NGVD for one day in the calendar year. See a) above.	
FDACS-15	1/3/20	11) Pages 8 - 15 - Overall Scoring Methodology Given the overall complexity of the scoring methodology, recommend more time for review and discussion and a technical public workshop through RECOVER with LO Stage Envelope Working Group members. The previous review opportunities and time allowed were not adequate to provide detailed input on the performance of the proposed methodology.	Thank you for the comment, we will try to incorporate your suggestions into the process in the future. During the LOSOM process there are many workshops and places for public input that we hope you will take advantage of.
FDACS-16	1/3/20	12) Page 8 Line 224 It is not clear what "Deviations above and below the envelope are generally scored, tallied and compared the same" means. Recommend more information and clear justification on this aspect of scoring be provided.	Clarified in text, but the scoring examples provided in the Figures and subsequent text should demonstrate the methodology.
FDACS-17	1/3/20	13) page 12, Lines 279 and 280 The Uncertainty Section ends with the statement "The varying width of the envelope and the varying penalty scores together account for uncertainty in the recommendations." Recommend deleting this sentence unless an independent expert review evaluating whether the approach described above is adequate to address uncertainty in the methodology proposed is performed.	Rewrote portions of the uncertainty section to clarify.
FDACS-18	1/3/20	14) Page 13, lines 326 and 327 The first bullet states "Adjusted approximately 0.5 ft. lower to align with originally cited research that specified 12.0 ft. and 15 ft as low and high targets, rather than 12.5	Added as requested.

		ft and 15.5 ft." Recommend the reference for this statement be provided in the bullet information.	
Local			
Loxahatchee River District (LRD)			
LRD-1	12/6/19	Lines 206-208; Is the penalty score equal to the number of times lake stage deviated from the desired lake stage envelope by a hundredth of a foot (approx. 30 cm)?	The penalty score is tallied on a daily basis, based essentially on deviations from the envelope. The scoring varies within a foot or 2 of the envelope but outside of that range is always essentially $(2+(2 \times \text{deviation [ft]}))$, or because there more ranges below, $(3+(2 \times \text{deviation [ft]}))$ for stages below. Yes, calculated at hundredths of a foot, which is how daily lake stage is reported. The boxes in figures 3A and B give a good example of what penalties would be in a given range. Text was revised to clarify.
LRD-2	12/6/19	Lines 221-224; I'm a bit confused with what was done with the number of days a penalty occurred, is the penalty value standardized by days?	The score would include both a total score for deviations above and below the envelope, but also the number of days (or time) in general that it was outside the envelope. That gives a duration and magnitude of deviation. Text was revised to clarify.
LRD-3	12/6/19	Uncertainty: Lines 271-274; It may be helpful to cite where to find further RSM-BN model info and/or present the model uncertainty values. (maybe the above comments I just described fit into line 314; evaluation tools needed?)	Incorporated link to RSM info on SFWMD website.

Lee County (LC)			
LC-1	12/16/19	Lee County agrees with the Corps' proposal to manage the Lake in a manner that maintains and improves water quality through supporting the continued health of the littoral areas and submerged plants.	Thank you for your comment.
LC-2	12/16/19	While we understand that this performance measure will be used to evaluate LOSOM alternatives, we are concerned about the consequences for estuarine resources if the Lake is managed to meet it. Specifically, we have concerns about the potential for increased negative impacts to estuarine resources in the Caloosahatchee River either through the potential for an increase in high volume discharge events and/or increases in months where the Caloosahatchee receives inadequate flow. Lee County therefore has the following recommendations:	This performance measure is just one of the many tools and performance measures that will be used by LOSOM and other CERP projects to score different alternatives. This performance measure focuses solely on the ecology of the lake and what is the preferred stage of the lake for the ecological function of the lake. This performance measure is just one of the many evaluation tools that LOSOM will use to select an alternative. The RECOVER Northern Estuaries Salinity Envelope Performance Measure will be used for the Caloosahatchee Estuary.
LC-3	12/16/19	1. In order to better understand the potential impact of the Performance Measure, Lee County requests that the Corps conduct a LOOPS Model sensitivity run using the proposed Lake Okeechobee Stage Performance Measure as a target.	This request should be made to the LOSOM Corps team, as they had asked for a variety of scenarios to use in sensitivity runs. This PM is being developed independent of the LOSOM process.
LC-4	12/16/19	2. As the Corps proceeds with the system-wide evaluation, we request a method for balancing the ecological needs of the Lake, with those of the Northern Estuaries (Caloosahatchee and St. Lucie) be established. For example, it is very likely that when Lake Okeechobee has experienced high stages, the estuaries will also have	Competing needs such as water supply, flood control and navigation are all considered as part of the CERP planning process or for LOSOM as part of developing the new regulation schedule. Ecological performance measures are designed specifically to address the health of a

		experienced high freshwater discharges. Both systems may be in need of "recovery".	given region or indicator. This is just one of the ecological performance measures being used in the evaluation. Multiple ecological indicators are used so that the effects on different regions can be evaluated. For example, there are additional performance measures for salinity in the estuaries, HABs, water supply, etc.
LC-5	12/16/19	3. The new Lake Okeechobee Regulation Schedule should balance the ecological needs of all components of the system and project purposes such as flood control and water supply. It is our hope that the Corps will pursue a system-wide performance measure through a defined deliberative process that balances all of these needs.	Competing needs such as water supply, flood control and navigation are all considered as part of the CERP planning process or for LOSOM as part of developing the new regulation schedule. Ecological performance measure are designed specifically to address the health of a given region or indicator. This is just one of the ecological performance measures being used in the evaluation. Multiple ecological indicators are used so that the effects on different regions can be evaluated. For example, there are additional performance measures for salinity in the estuaries, HABs, water supply, etc.
Palm Beach County (PBC)			
PBC-1	12/19/19	Palm Beach County is committed to protecting the interests of its residents and the natural environment in which they live and work. Lake Okeechobee is a critical component to achieving environmental restoration, water supply, navigation, agriculture, tourism and recreation objectives in South Florida. As such, Palm Beach County residents, taxpayers and visitors depend on healthy and	Thank you for your comment.

		predictable lake levels to sustain a robust and diverse economy.	
PBC-2	12/19/19	A 15-day review and comment period for the Draft Lake Okeechobee Stage Envelope Performance Measure (PM) is wholly inadequate for a resource as important as Lake Okeechobee. Additional time is needed to understand the complexities and any consequences of the Draft PM, especially since the Corps has held no public meetings nor engaged with Palm Beach County staff or stakeholders on the Draft PM.	The normal review period is 10 days for RECOVER performance measures because they are short, technical documents. This review was extended to 30 days. RECOVER is trying to meet the needs of the LOSOM project schedule.
PBC-3	12/19/19	Below are comments on the Draft PM that were developed within the extremely limited review and comment period:	Thank you for your comment. See responses to specific concerns below.
PBC-4	12/19/19	Page 8: Do both components of the threshold to shift from Normal to Recovery envelopes need to occur to implement a shift? If not, it appears from the document that a single day with the Lake stage above 17 feet would result in shifting from Normal to Recovery envelope the following January 1. What is the scientific justification to select 17 feet? What was the scientific basis to select 13 feet in the Normal to Recovery threshold component 2?	There are numerous citations and thorough discussion regarding impacts of water levels at 17 feet. There are also analyses regarding 13 ft threshold, which has been moved to a new Appendix. Regarding the single day thresholds, see also response to comment FDACS-11 regarding buffers. Keep in mind there must be a specific trigger in order to specify envelope targets for evaluating model outputs, whether it be 17 ft, 16.89, or 17.34. We clarified in the text that specific thresholds are necessary for evaluating model outputs, but if they were used for management decisions there would need to be ecological monitoring to verify actual state of lake indicators like SAV.

PBC-5	12/19/19	<p>Page 8: It is not clear from the document how the components of the threshold to shift from Recovery to Normal envelopes (e.g. Lake stages are below 12 feet (3.66 meters) for 90 days between April 15 and September 15 OR Stages are below 11.5 feet (3.51 meters) for 60 days between May 1 and August 1) were derived or developed. For example, why 90 and 60 days? Why 12 and 11.5 feet? Why between April 15 and September 15? Why between May 1 and August 1?</p>	<p>These are general targets related to months of exposure, or a measure of hydroperiod. It is common to evaluate in 30, 60, 90, 120 etc., day increments. Exposure or inundation of single events is more important to vegetation diversity than total exposure or inundation over multiple events. As for timing, those are the times of year low stages are most likely to occur, based on historical stages and general transition period between the dry and wet seasons. We also added an evaluation of 2019 stages and SAV response to an Appendix to further support these targets.</p>
PBC-6	1/2/20	<p>A 30-day review and comment period for the Draft Lake Okeechobee Stage Performance Measure (PM) is wholly inadequate for a resource as important as Lake Okeechobee. Additional time is needed to understand the complexities and any consequences of the Draft PM, especially since it appears to supersede three existing Lake Okeechobee stage-related PMs and the Corps has held no public meetings nor engaged with County staff or stakeholders on the Draft PM.</p>	<p>The normal review period is 10 days for RECOVER performance measures because they are short, technical documents. This review was extended to 30 days. RECOVER is trying to meet the needs of the LOSOM project schedule.</p>
PBC-7	1/2/20	<p>Below are comments on the Draft PM that were developed within the extremely limited review and comment period:</p> <ol style="list-style-type: none"> 1. Please provide additional explanation or justification for the apparent reinterpretation of existing science (Havens 2002) that resulted in a shift in the beneficial range of water levels from 12.5 to 15.5 feet (as documented in the 	<p>The cited document actually states 12 and 15 feet, not 12.5 and 15.5. It is unclear how the earlier PM used the existing science to justify a higher envelope than the cited work evaluated. This was one of the reasons the PM was updated, to address this issue. Further, we included more references to explain and justify modifications in the latest version.</p>

		2007 Lake Okeechobee Stage Envelope PM) to 12.0 to 15.0 feet NGVD29 in the 2019 Draft PM.	
PBC-8	1/2/20	2. Please provide information on the science that warranted a second “Recovery” stage envelope.	Numerous studies, as cited in the document, have shown recovery of SAV and lower elevation emergent marsh communities at lower lake stages, or documented the benefit of lower lake stages to offset high-water impacts. However, we added additional information from the 2019 growing season and subsequent SAV response. In the earlier PM, there was no mechanism to target lower stages after high-water impacts, and no definition of those targets; despite recognition of their benefits. To address this gap in evaluation methods, this draft update establishes targets and defines criteria to trigger those varying targets. We attempted to document the science behind those envelopes through the analyses shown in the document, as well as the numerous works cited throughout the document.
PBC-9	1/2/20	3. Submerged aquatic vegetation (SAV) species other than <i>Chara</i> are likely more ecologically important to Lake ecosystem health and more resilient to high water and wave action (see Havens et al. 2004 referenced in the Draft PM). Please provide the justification and science relied upon to support only <i>Chara</i> as an indicator for desirable Lake stage conditions.	As stated in the document, <i>Chara</i> responds more quickly than vascular SAV communities to improved growing conditions, but both benefit from higher light penetration, as documented in the Havens et al 2004 document mentioned. <i>Chara</i> is a good indicator of growing conditions for the whole SAV community but rooted vascular species can be slower to respond. We are not implying other SAV species are less important or are not expected to benefit from the Recovery envelope and clarified this in the

			text. Further, Havens et al. 2004 was referencing extreme low stages, which are not promoted in this document for Recovery targets. We added an Appendix with info on results of 2019 lake stages on vascular SAV species as well.
PBC-10	1/2/20	4. Do both components of the threshold to shift from “Normal” to “Recovery” envelopes need to occur to result in a shift? If not, it appears from the document that a single day with the Lake stage above 17 feet would result in using the “Recovery” envelope the following year. What is the scientific justification to select 17 feet? What was the scientific basis to select 13 feet in the “Normal” to “Recovery” threshold component 2?	Duplicate comment of PBC-8
PBC-11	1/2/20	5. It is not clear from the document how the following underlined components of the threshold to shift from “Recovery” to “Normal” envelopes in Lines 218-220 were derived or developed: “Lake stages are below <u>12 feet</u> (3.66 meters) for <u>90 days</u> between <u>April 15</u> and <u>September 15</u> OR Stages are below <u>11.5 feet</u> (3.51 meters) for <u>60 days</u> between <u>May 1</u> and <u>August 1.</u> ”	See response to PBC-5
PBC-12	1/2/20	6. From a practical standpoint, the use of a dynamic performance metric and target that are dependent on the previous year’s conditions will likely present implementation issues when incorporated into a long-term modeling evaluation. In addition, how does one differentiate between an alternative that ends up being evaluated with the “Normal” envelope for 90 percent of simulation years versus an alternative that ends up being evaluated with the “Recovery” envelope for 90 percent of	We think specifying targets for “recovery” conditions is a strength over the original draft and is easily implemented into alternatives evaluation via the specified triggers. The lower envelope, and if it’s not achieved for several years, captures long-term impacts of high-water events and the fact they are additive until addressed; e.g. lost habitat is lost until light penetration improves enough to recover it.

		simulation years? Could these two alternatives have the exact same score? Is there a target number of model simulation years to be within the “Normal” and “Recovery” envelopes?	Therefore, a simulation where a Recovery envelope is specified for most of the scenario would imply that stages were not sufficiently low to recover from the original impact, and would score worse relative to a scenario that was able to stay within the Normal range more frequently. We did not specify a target number of normal or recovery years. Ideally, no recovery envelopes would be needed, in that it would imply no high-water impacts necessitated recovery conditions. Text added to clarify.
PBC-13	1/2/20	7. Please provide additional information regarding the rationale to not include extreme high and low Lake stage durations in the Draft PM.	Durations above or below extreme stages will be tallied, as well as number of events. This is specified in the document relative to other simulations. Similar to the original PM, extreme high and low stages are defined as simply targets to be avoided, without durations specified. The PM tallies time above or below the extreme events, just as the original PM. However, model outputs of any alternatives being evaluated will show durations above any stage thresholds and could be evaluated by any group. We do not specify durations here, though point scores for stages outside the envelope will capture extreme events and their durations through high penalty scores.
PBC-14	1/2/20	8. Please explain how water level conditions that are desirable for threatened and endangered species [e.g.	Snail kite nesting is proportional to both appropriate water levels and nesting/foraging habitat. The "Normal" conditions envelope meets the needs for optimal snail kite nest

		Everglade Snail Kite (<i>Rostrhamus sociabilis</i>) are incorporated into the Draft PM	initiation on March 1 (as identified in Fletcher et al [2018]) with the current locations and amount of nesting substrate in the Lake. The "Recovery" conditions envelope is lower than optimal for kite nest initiation, but we anticipate this target will improve overall nesting and foraging habitat in subsequent nesting seasons. We also believe these "Recovery" conditions represent a target that will have a lower return frequency, though it is not specified. The PM does not address springtime recession rates for kites or other species, which would be addressed through operations of LORS or LOSOM. Text was added regarding snail kite needs, as well as specifying recession rate targets.
PBC-15	1/2/20	9. The links in Section 7.0 no longer provide the listed files.	Updated the hyperlink.
PBC-16	1/2/20	Considering the limited stakeholder engagement that occurred during the development of the Draft PM, the fact that the Draft PM appears to supersede three existing Lake Okeechobee stage-related PMs and other issues and questions above, the County recommends the continued use of the 2007 Lake Okeechobee Stage Envelope PM until the above issues are appropriately addressed.	The draft PM only supersedes one PM, which was the Lake Stage PM. The 2007 update of that PM actually incorporated the 2 Extreme PMs into the same document. The evaluation of extreme events has not changed from the original 2007 version. Further, this update allows for consideration of antecedent conditions, timing, and duration of high and low water events, which were all specifically identified as areas of need for PMs by the UF Water Institute's 2020 review. This citation was added to the latest version.

PBC-17	1/2/20	As a Lake Okeechobee System Operating Manual Project Delivery Team Member and an interested stakeholder, the County would like to be involved with any future development and implementation of PMs related to Lake Okeechobee.	Palm Beach County has been added to the RECOVER Lake Okeechobee Regional Team distribution list.
City of Clewiston Board of Commissioners (CCBC)			
CCBC-1	12/19/19	As an overall observation, the timing of the RECOVER effort should be questioned. Why is the USACE pursuing modifications so quickly? We understand the desire to use the new performance measure to evaluate the Lake Okeechobee Systems Operations Manual (LOSOM) alternative choices, but it seems more science and public discussion should happen first.	There has been a need for RECOVER to update this performance measure (and several others) and is trying to meet the needs of the LOSOM project schedule.
CCBC-2	12/19/19	Since the Herbert Hoover Dike strengthening project is scheduled for completion in 2022, it is relevant and should also be considered. The federal government is investing approximately \$1.0 billion in the infrastructure, so any reduction in Lake levels seems to be inconsistent with the improved capability of handling more water. The Lake and its ecology as well as our region all need water. The repairs help accomplish this goal.	That will be considered as part of the LOSOM evaluations and EIS process.
CCBC-3	12/19/19	With the population growth in Florida increasing at approximately 1,000 people daily and the fact that the bulk of this growth is projected for South Florida, it is reasonable to assume that the need for water quantity will increase accordingly thus putting more pressure on the Lake as a supply source. The Florida Office of Economic & Demographic Research (EDR) supports this statement in the findings of their 2019 assessment of Florida's water	Competing needs such as water supply, flood control and navigation are all considered as part of the CERP planning process or for LOSOM as part of developing the new regulation schedule. Ecological performance measures are designed specifically to address the health of a given region or indicator species. The

		resources and conservation lands. The report in part states: "Regarding water resources, according to the water management districts, water demand is projected to increase by 17 percent in the next 20 years and reach 7,515.9 millions of gallons daily by 2035...". Florida's future growth is an objective of the Everglades restoration program, so we can all share benefits from all infrastructure that stores water and make it available for later. These points made, there does not appear to be adequate scientific justification to change the current Lake performance measures and ill-advised to lower Lake water levels.	performance measure is being updated based on recent scientific information.
CCBC-4	12/19/19	USACE publications in June, 2019 on this topic state that "The LOSOM study will also consider the future Comprehensive Everglades Restoration Plan (CERP) infrastructure that will provide additional flexibility for lake operation." RECOVER appears to be primarily focused on changing the performance measure, but not showing results from scientific studies related to both the high end and low end of operations and the flexibility added by the repaired Dike. By the USACE's own acknowledgement, "...Lake Okeechobee is also the keystone in the flood protection and water supply system." To make a judgment that Lake water levels be lowered by any amount before firm science is publicly discussed is premature.	Competing needs such as water supply, flood control and navigation are all considered as part of the CERP planning process or for LOSOM as part of developing the new regulation schedule. Ecological performance measures are designed specifically to address the health of a given region or indicator species. The performance measure is being updated based on recent scientific information.
CCBC-5	12/19/19	Absent this, the LOSOM process should stick with the existing Lake stage performance measure. To do otherwise is not acceptable in the view of many constituencies who rely upon the Lake.	Thank you for your comment.

CCBC-6	12/19/19	<p>It is appreciated that the USACE evaluation is based on the 52 year hydrograph of Lake stages (Page 8 of 15), but, the 15 page published report includes only references to studies and simply acknowledges the research.</p> <p>Nonetheless, the report recommends a 0.5 foot reduction on the low level and high level each with the lone stated justification (page 13 of 15) being “Adjusted approximately 0.5 ft lower to align with originally cited research that specified 12.0 ft and 15 ft as low and high targets, rather than 12.5 ft and 15.5 ft.” If this was “originally cited research that specified” the lower levels, why has the USACE and the current Lake Okeechobee Stage Envelope performance measure been set at the higher levels all these years?</p>	<p>There was no justification for why the original envelope, which technically included stages of 12-16 ft, cited studies evaluating 12 and 15 ft stages as supporting evidence. Given the discrepancy, this PM has been evaluated against actual stages since its inception and there is evidence that the stages are in fact a little higher (added citations showing declining SAV, poor trends in indicators). Specifically, the scoring methodology was not very sensitive to stages that have been demonstrated to have impacts to lake health (0 points until 16ft). More citations have been added, as well as info from the 2019 SSR regarding lake health and recent hydrology. See also the new Appendix regarding effects of 2019 stages on SAV.</p>
CCBC-7	12/19/19	<p>What was the justification for the higher levels then and what has changed? This is confusing to the reader especially without the specific research being cited or made a part of the report.</p>	<p>See previous response to CCBC-6</p>
CCBC-8	12/19/19	<p>To further elaborate on this question of why the current levels are 12.5 ft and 15.5 ft, Section 2.0 Justification (page 1 of 15), states that “A wide body of published research (summarized in Havens 2002) documents the benefits of seasonally variable water levels within the range of 12.0 ft ... as a June-July low and 15.0ft ... as a November-January high, on the plant and animal communities of Lake Okeechobee.” The section goes on to reference 1995 and 2004 litigation and 2002 Havens research. All this information was known when the current higher limits were established. The report does not reference any more</p>	<p>The original PM cites research supporting 12-15 ft as the best stage targets and does not provide explanation for how a 12-16 ft "envelope" was developed from that. We added additional information regarding the state of several indicators after stages had been near the original envelope, and more justification for why it needed to be adjusted... beyond the fact the original cited work and others support 12-15, instead of 12.5 - 15.5.</p>

		recent research that justifies the lowering of the levels now as proposed. If such information exists, it should be referenced as the justification.	
CCBC-9	12/19/19	Additionally, there does not appear to be any analysis that the proposed 0.5 ft reduction in low and high limits will have any quantifiable positive impact on plant and/or animal species.	There are numerous citations regarding water level targets that were specified, as well as analyses within the document showing benefits of low water to SAV. More info was added regarding state of several indicators and tying lower stages to recent SAV recovery in 2019. We expect the reductions will have the benefits cited in the earlier studies and as described throughout the document.
CCBC-10	12/19/19	On the contrary, there is also no analysis listed of the negative implications on water quantity that the lower proposed levels will have on water supply. This should be easily quantifiable based on the amount of water that 0.5 ft constitutes for the entirety of the lake. Why does the report not analyze this impact on the USACE ability to meet water demands downstream? Again, water should be kept in the Lake to benefit its environment and all the people and resources that rely on it.	Competing needs such as water supply, flood control and navigation are all considered as part of the CERP planning process or for LOSOM as part of developing the new regulation schedule. Ecological performance measures are designed specifically to address the health of a given region or indicator species. The performance measure is being updated based on recent scientific information.
CCBC-11	12/19/19	Section 4.3 Uncertainty (page 12 of 15), acknowledges that "There has not been a formal uncertainty analysis of this performance measure. There is a known amount of uncertainty associated with lake stages predicted by the RSM-BN model, and an unknown amount of uncertainty associated with how seasonal variation in lake stage affects various components of the lake's plant/animal community." This language is not surprising in the sense that uncertainty is expected when there are so many	Uncertainty section was rewritten to clarify. See response to FDACS-17

		variables that affect the Lake and its ecology, but since the point is raised in the report, why has there not been a “formal uncertainty analysis” done and is this the norm for reports/studies with this significant an impact?	
CCBC-12	12/19/19	Without an uncertainty analysis, it seems much too risky to propose a lower Lake stage envelope. We certainly cannot rely upon rain coming at the time we desire it. Specifically, with regard to the “plant/animal community”, would such an analysis not be advisable given the concerns widely expressed on environmental considerations in general and impacts on species such as the endangered snail kite which apparently has not been observed in the last couple of years.	See response to FDACS-17 and to PBC-14.
CCBC-13	12/19/19	The report references the impact on animal populations as follows: (page 2 of 15) “Extreme low stages (<10 ft) also have multiple negative impacts to lake health.” “Low lake stages also result in direct losses of habitat that can severely limit or even eliminate entire breeding seasons for many species of fish and wildlife.” The same report section also states “Ecological recovery from extreme lake stages can be slow, requiring multiple years of appropriate stage regime to recover.” Given that the HHD project is improving safety on the high end of lake elevations thus reducing some of the risks associated with extreme high elevations, why would the USACE risk such impacts as those referenced in this section by lowering levels at this time as proposed?	There is also ample discussion regarding high-stage impacts, and more information was added regarding tradeoffs between low and high stages. Dike safety, water supply, etc. are not part of the lake ecological review, but have their own evaluation metrics. Lake ecology is affected by the bathymetry of the lake and the fact that the base of the levee is at around 15 ft in elevation, so water only gets deeper after that, marshes don't expand laterally. The 12-15 ft target is considered the best range of stages to maximize the extent and health of littoral wetlands, without creating terrestrial habitat at high elevations or losing marsh to open water at low elevations. Further, competing needs such as water supply, flood control and navigation are all considered as part of the CERP planning process or for LOSOM as part of

			developing the new regulation schedule. Ecological performance measures are designed specifically to address the health of a given region or indicator species. The performance measure is being updated based on recent scientific information.
CCBC-14	12/19/19	Further, what are the recognized benefits of lowering the levels as proposed?	See response to PBC-8 regarding benefits of lower stages. Additionally, improvements to lake health, as stated throughout the document, are expected by bringing the envelope closer in line with the original cited research supporting stage ranges of 12-15 ft.
CCBC-15	12/19/19	A final observation is that the two week comment period for this report is deemed too short to solicit adequate input on such an important and intricate set of variables especially when considering its release such that the deadline is just before the holiday season which will likely adversely impact on the amount and depth of the comments submitted.	The normal review period is 10 days for RECOVER performance measures because they are short, technical documents. This review was extended to 30 days. RECOVER is trying to meet the needs of the LOSOM project schedule.
CCBC-16	12/19/19	In conclusion, the City of Clewiston is deeply concerned about this topic and the health of Lake Okeechobee and would welcome the opportunity to further collaborate with USACE officials on next steps to consider improvements to the LOSOM process going forward including any additional studies and reports such as the RECOVER effort. City officials look forward to partnering with all stakeholders to this end.	Thank you for your comment. Please stay engaged as the LOSOM study continues.
City of West Palm Beach (WPB)			

WPB-1	1/3/20	The City of West Palm Beach (City) is a vested stakeholder in the ongoing processes of the Comprehensive Everglades Restoration Project (CERP) & its northern counterpart within the Loxahatchee River Watershed Restoration Project (LRWRP). The City, as well, has a vested interest in the related issues concerning the present & future water management of Lake Okeechobee; including the evolving management practices being proposed within the present Lake Okeechobee System Operating Manual (LOSOM) & the interrelated performance assurance measures being developed under the RECOVER initiative.	Thank you for your comment. Please stay engaged as the LOSOM study continues.
WPB-2	1/3/20	Lake Okeechobee along with the conveyance connections within L-8 basin is are a key component of the City's long-term water supply & wetland ecological restoration planning & modeling. This linkage to Lake Okeechobee has supplemented the City's water supply deficits during protracted dry seasons or recurring drought regimes over the past decades, while ensuring protection of the critical hydroperiod aspects of Grassy Waters and providing a refuge for the Endangered Everglades Snail Kite during such times.	Competing needs such as water supply, flood control and navigation are all considered as part of the CERP planning process or for LOSOM as part of developing the new regulation schedule.
WPB-3	1/3/20	Lake Okeechobee flow connections to the City's hydrologic system also augments Minimum Flows & Levels (MFL's) during the dry season to the federally designated Wild & Scenic Loxahatchee River through Flow-Way One (LRWRP/CERP) which provisionally conveys critical compliance flowage thru Grassy Water.	Competing needs such as water supply, flood control and navigation are all considered as part of the CERP planning process or for LOSOM as part of developing the new regulation schedule.
WPB-4	1/3/20	In this respect, changes in flows, volume, quality and distribution from Lake Okeechobee have important implications, near and long-term, to the City as a whole &	Competing needs such as water supply, flood control and navigation are all considered as part of the CERP planning process or for LOSOM

		to the entire L-8 Basin water budget. It is within this context that the City offers the following comments:	as part of developing the new regulation schedule.
WPB-5	1/3/20	The City believes that the existing interim stage-level range between 12.5 NGVD at the end of the normal dry season (end of May) to 15.5 NGVD during a normal wet season cycle (end of November), can achieve all of the requisite terms, goals, purposes & broader intent of the original C & SF Project. This follows a similar adaptive management process as stated in the Revised Draft Integrated Lake Okeechobee Watershed Restoration Project Implementation Report & Environmental Impact Statement which recommended moderating of the Lakes stages through reduction in extreme lows & moderate highs to promote the overall health of the Lake by maintaining stages within the ecological range more frequently. This range is like the 1951-1978 Beneficial regulation schedule enacted on Lake Okeechobee which was considered a period of marsh plant diversity & health (Pesnell & Brown,1977).	Thank you for your comment. We agree that the period of record mentioned had similar stage ranges to both the original and updated PM envelopes. However, water quality was much better at that time, so light penetration was greater at the same stage, and nutrient enrichment of the interior marshes was lower at the same high stage, etc. Degraded water quality, higher sediment loads, reduced light penetration, all further compound lake stage effects on lake health. The reduction in WQ alone is worthy of adjusting the envelope down, but was likely what drove the original cited work of Havens 2002 to use 12 and 15 ft as stage targets.
WPB-6	1/3/20	The City in agreement with other stakeholders contends that all elements of the C & SF Project are integrated within the larger scope of CERP. The section 601 of the Water Resources Development Act 2000 (WRDA), approved by Congress under CERP enacted the necessary framework for the modification of the C &SF Project in-line with priorities & provisions of CERP. Section 601(h) of WRDA 2000 states "the overarching objective of the Plan elements of CERP is restoration, preservation, & protection of the South Florida ecosystem while providing	Competing needs such as water supply, flood control and navigation are all considered as part of the CERP planning process or for LOSOM as part of developing the new regulation schedule.

		for other water-related needs of the region, including water supply & flood protection.	
WPB-7	1/3/20	The City also contends that there is not adequate modeling of risk of disruption of these water supply elements within the Performance Measures (PM's) metric system proposed under LOSOM Draft. The proposed conceptual scoring mechanism is weighted heavily in regards to exceedances associated with high-levels (>16.0NGVD) & consequently lessens the gravity of low-level exceedance (<11.0 NGVD) & the existential threats to water supply security & consequential socioeconomic & public welfare & safety, as well as, the longer term impacts to the Lakes ecologically sensitive wetland habitats & life cycle support components to an array of listed & endemic species that depend critically on functioning wetlands within the confines of Lake Okeechobee & interconnected wetland ecological systems.	Competing needs such as water supply, flood control and navigation are all considered as part of the CERP planning process or for LOSOM as part of developing the new regulation schedule. Ecological performance measures are designed specifically to address the health of a given region or indicator species. Low lake stage impacts are discussed thoroughly throughout, and low lake stages are evaluated similar to high lake stages... larger penalties accrue the farther stages deviate from the envelope.
WPB-8	1/3/20	Dependent on Lake Okeechobee flows. Considerations should be made toward developing more robust models to interpret "frequency & severity of water supply elements & associated water restrictions for the whole of the Lake Okeechobee Service Area."	This comment should be directed to the LOSOM development process, which is independent of this document. Competing needs such as water supply, flood control and navigation are all considered as part of the CERP planning process or for LOSOM as part of developing the new regulation schedule. Ecological performance measures are designed specifically to address the health of a given region or indicator species.
WPB-9	1/3/20	LOSOM's large hydrologic influence on all downstream ecological systems, wellfields, utilities, agriculture & economies should give pause in the manner of how cumulative effects are interpreted, defined, anticipated, &	This document is only one of the Ecological performance measures designed to specifically address the health of a given indicator or region. It is not intended to address cumulative

		mitigated. Cumulative impacts, both positive & negative, do not appear to have been thoroughly vetted within the present proposed Plan or models, or ascertained within any constructive manner in the present LOSOM. This would suggest a too narrow interpretation of assumed benefits derived from the Plan & falls short of the basis of review under terms of NEPA examination.	impacts. Competing needs and cumulative impacts will be addressed in other aspects of the LOSOM planning process.
WPB-10	1/3/20	The Performance Measures (PM's) of LOSOM associated with indicators that interpret functionality aspects of prescriptive stage-levels within Lake Okeechobee should be made more robust. The City would like the Corps to consider additional Submerged Aquatic Vegetation (SAV) indicator species that are less susceptible to wave action & desiccation during drawdowns & droughts besides Stonewort (<i>Chara</i> spp.).	We added more clarity regarding our use of <i>Chara</i> as a surrogate for light penetration in general, and also include some recent vascular SAV analyses to demonstrate expansion in 2019 that was maximal along the drying edge of summer water elevations. Further, we added info regarding gradual degradation of vascular SAV in recent years, which further demonstrates the value of a moderate Recovery envelope.
WPB-11	1/3/20	In closing, the City feels that with adequate monitoring, monthly & bi-annually, to acquire relevant "realtime" feedback of conditions throughout the physical limits of Lake Okeechobee & its extensive service area, that LOSOM is a meaningful step forward. The City applauds the Corps efforts but requests a process that engages stakeholders including the City in a more open dialogue and input. The City also proposes that the Corps continue the LOSOM 2007 schedule until a more thorough review and scientific study is completed and all risk scenarios have been adequately considered.	The development of this PM is independent of the LOSOM process and is not a regulation schedule. This comment appears to be related to the ongoing development of LOSOM, and we hope you continue to stay engaged in that public process.

PRIVATE

United Waterfowlers Florida (UWF)			
UWF-1	12/6/19	UNITED WATERFOWLERS FLORIDA supports the proposed “targets” of 12 feet low, 15 feet high for the Lake. These are good for the Lake’s habitats. Knowing, Mother Nature, actually has a lot to do with the levels we cannot control!	Thank you for your comment.
UWF-2	12/6/19	The occasional “draw down” to 11 feet or so every five years, or following a storm that kept the Lake too high, is also recommended.	Thank you for your comment.
UWF-3	12/6/19	What is totally opposed is any scheme to drive the Lake down to drought levels (10 feet?) every year. This would be a disaster for the Lake’s marshes.	Thank you for your comment.
Anglers for Lake Okeechobee (ALO)			
ALO-1	12/19/19	On behalf of the thousands of amateur and professional Lake Okeechobee fishermen and women, tourists and local residents who cherish Lake Okeechobee, I would like to submit the following comments as the U.S. Army Corps of Engineers considers public comment when determining a Lake Stage Performance Measure.	Thank you for your comment.
ALO-2	12/19/19	Lake Okeechobee needs a lake stage that works for the Lake Okeechobee fishing community, provides save and available navigation year round, and benefits the lake’s ecology. According to scientists and from our experience over decades, we believe that preferred level is between 12.5 and 15.5 feet.	FWC’s past research has shown fish actually benefit from lake stages of 12-15 ft, as does the science that was used to justify the 12.5-15.5 ft range (without justification for why it was higher). We recognize it is harder for fisherman to get on the lake at 12 ft and below, which impacts fishing, but 12-15 ft is still best for the actual fish populations. This is because 12-15 ft is the best for submersed and emergent vegetation and fish are highly dependent on good habitat for spawning and food.
ALO-3	12/19/19	In addition, the science cited in this draft measure appears to be same science used by RECOVER when it developed the	While there is new science that supports the 12-15 ft as the best ecological range, the old

		existing performance measure, establishing the preferred 12.5 to 15.5 level.	science also showed 12-15 ft as being the best ecological range. 12.5-15.5 was probably used as a compromise with stakeholders. We still believe 12-15 ft to be the best ecologically. This Performance Measure is only a recommendation of the best ecological stages. We clarified in the text how there was a discrepancy between the old version and cited literature, and how this newer version is supported by the original studies as well as newer information.
ALO-4	12/19/19	It is not clear if new science exists to support the "recovery" operations that would lower the Lake even further, but regardless, such recovery operations are not appropriate for a performance measure, and should be considered in the development of the overall Lake schedule.	There are many examples of lower lake stages, such as what is used in the "recovery" stage, improving water clarity and quality after habitat has been degraded, and that is cited in the document. Habitat on Okeechobee is typically degraded by either hurricanes or lake stages that are too high for vegetation to survive. Once habitat is degraded, the lake needs to be "reset" by using lower lake stages than normal to help reduce turbidity which improves light penetration to plants. When plants recover, dependent wildlife, such as fish, can also start to recover. Increased fish spawning has been documented after drawdown/drought events before. Within a few years of a drawdown/drought, fisherman are able to see the results since those fish are now large enough to catch and populations have increased enough to continue having good spawns, leading to good fishing for many years.

			<p>This is simply a recommendation of what is best ecologically if lake stages go beyond the normal stage envelope, and recommendations of what levels would be needed to achieve that. Without this Recovery envelope, there would be no way to evaluate which alternatives might offset high stage impacts better than others. Further, we added information regarding how incorporating antecedent conditions into PMs was a specific recommendation by the UF Water Institute, which is what the use of 2 envelopes does.</p>
ALO-5	12/19/19	<p>In determining the Lake Stage performance measure, we hope you will consider providing an availability of water that ensure fish and aquatic plant habitats can thrive. A lower lake level would mean grass would die, which in turn prevents a healthy fishery. Additionally, a lake level too high will restrict sunlight and the ability for grass on the lake to grow.</p>	<p>We agree that extreme highs (above 17 ft) and extreme lows (below 10 ft) can be harmful to plants and animals on the lake. Neither the Normal nor Recovery lake stages approach those levels. Decades of research have shown that 12-15 ft are the best lake stages for plants and animals as long as there is variation within that range so that areas can dry out or flood throughout the year, and at different rates between years. Research has also show periodic drawdowns (i.e. Recovery envelope) can be beneficial to help a lake recover after prolonged or extreme high-water events have occurred which damaged the vegetation. This occurred in 2019 without actual targets and stages were lower than the Recovery envelope for parts of the year.</p>
ALO-6	12/19/19	<p>The Army Corps must also allow for lake levels that provide boaters with an abundant water supply so the lake remains</p>	<p>Navigation will be evaluated as part of LOSOM. This performance measure is just one of the</p>

		navigable. We agree with the Florida Inland Navigation District's prior comment letters to the Corps that a lower Lake Okeechobee puts lives at risk.	many tools and performance measures that will be used by LOSOM and other CERP projects to score different alternatives. This performance measure focuses solely on the ecology of the lake and what is the preferred stage of the lake for the ecological function of the lake. This performance measure is just one of the many evaluation tools that LOSOM will use to select an alternative.
ALO-7	12/19/19	Unfortunately, this past year when the Army Corps decided to lower Lake Okeechobee outside of its approved LORS 08, three young, amateur anglers were stranded on the lake during a tournament. Thankfully, they were towed to shore, but it is clear this incident occurred due to decisions made by the Army Corps. We simply cannot adopt a lake schedule that would make these scary scenarios more likely.	Navigation will be evaluated as part of LOSOM. This performance measure is just one of the many tools and performance measures that will be used by LOSOM and other CERP projects to score different alternatives. This performance measure focuses solely on the ecology of the lake and what is the preferred stage of the lake for the ecological function of the lake. This performance measure is just one of the many evaluation tools that LOSOM will use to select an alternative.
ALO-8	12/19/19	We hope you will give serious consideration of the interests of the Lake Okeechobee boating and fishing community. We hope the Army Corps adopts a lake schedule that works for everyone, including us.	Thanks for the comment
Everglades Foundation (EF)			

EF-1	12/19/19	<p><u>Derivation of the Envelope is Lacking</u></p> <p>The Lake Okeechobee Performance Measure purports to use one metric to determine the optimal ecological function of a complex ecosystem. It therefore likely incorporates many ecological components and their interactions. However, the constituent components are not clearly identified, nor are their potential trade-offs. Moreover, the data sets and literature citations that would provide the scientific predicate for understanding how those components interact and result in this proposed envelope are not provided.</p>	<p>There are certainly many aspects of lake health encompassed in an overall "envelope" of stage ranges that include seasonal and inter-annual variability. We mentioned in multiple areas the kinds of benefits or effects various stages have on different components of wildlife or vegetation but added more language throughout regarding tradeoffs between high/low portions of the envelope. We feel this update expands considerably on the background information, tradeoffs, complexities of the envelope, data provided, and literature cited than the original version, and provides the right balance of information summary and terse communication required in these RECOVER PM sheets.</p>
EF-2	12/19/19	<p>As an example of our concern, the data set and modeling provided to support the envelope is Submerged Aquatic Vegetation (SAV). Fig. 2 shows a clearly linearly relationship with stage and show that lower stages even below 11 ft are quite beneficial for SAV. The report cites Havens et al. (2002), which states that prolonged periods of low stage <12.1 ft (12 months or more) can negatively impact the littoral zone and encourage invasive species expansion, but only scored individual events of low stages < 11.15 ft as negative. Havens et al. (2002) also mention that the negative impacts of low lake levels to the littoral zone may be somewhat compensated by improvements in SAV. Therefore, evidence for other ecological indicators that would inform this minimum stage guideline of 12 ft should be presented.</p>	<p>The figure referenced had a linear model fit to the scatterplot, but a sigmoidal relationship is probably more accurate (updated in later version). In other words, there are limits to the low and high impacts of lake stage on the SAV. As stages get very low (<11 ft), the costs begin to outweigh benefits. Similarly, with high stages. We agree that stages less than 12 feet for 12 consecutive months or more would have negative impacts to the littoral zone, which are discussed. Those stages are well below even the Recovery envelope and would result in major penalty scores when evaluated with this protocol. We feel we provided multiple sources of information regarding impacts to other</p>

			ecological indicators and their relationships to stage, as does the Havens document cited. We added more information, citations, and discussions of tradeoffs throughout, however, to address this and similar comments.
EF-3	12/19/19	<p><u>Ecological Data and Monitoring</u></p> <p>Lake Okeechobee has not had the same, well-developed modeling efforts as has been done for the Greater Everglades region. There are modeling efforts for submerged aquatic vegetation (Zach Welch, SFWMD), and work is currently being done on wading birds (Dale Gawlik's lab at Florida Atlantic University). Robert Fletcher (University of Florida) also has estimated snail kite nesting success in Lake Okeechobee and found that the Lake is an important nesting area for snail kites. Besides these efforts, many species found in the Lake do not currently have any models at all besides simple metrics based on hydrology. However, Fig. 4 notes numerous ecological indicators for monitoring. The existing data for these attributes should be statistically analyzed in respect to stage, environmental conditions, water quality, etc. to better inform this performance metric. Such analyses would lead to a more a rigorous understanding of the drivers behind the ecological health of the lake.</p>	Work continues as funding permits to evaluate stage and other predictor effects on a variety of ecological indicators. Some indicators are more directly tied to water levels, whereas others (like wading birds and fish) can have many other factors that blur the relationship. For more information, we added citations for works like Johnson et al. 2007 and Havens and Gawlik 2005 that are good summaries of stage impacts on multiple indicators. This PM update does not end all efforts to improve the science and understanding of stage and other factors on lake health. Just as this effort is doing, we can and will update performance metrics as new science is available to inform them.
EF-4	12/19/19	<p><u>Contradictory Statements about Cattail Expansion in the Lake</u></p> <p>The 2017 and 2018 SFWMD South Florida Environmental Reports state that cattail expanded under wetter conditions, which contradicts the last line of the 2nd paragraph on page 2, and also 1st line of page 3, which states that low lake stages promoted the expansion of cattails.</p>	Cattail expands into higher elevations when lake stages are high, as noted in the SFER citations in the comment, but can expand to lower elevations in dry conditions. This was clarified in the text. For example, areas in Bay Bottom were exposed for the first time in 2007-2008 and for long periods. Cattail is a rapid invader and took advantage of those conditions and will remain unless high wind and wave

		<p>From 2017 SFWMD South Florida Environmental Report, “In 2015, much more of the marsh was inundated for a greater length of time compared to 2011. This allowed for the expansion of cattail, which dominated 29 percent of the grids (4,375) in 2015 compared to only 13 percent during the dryer 2011.”</p> <p>From 2018 SFWMD South Florida Environmental Report, “Cattail was the most abundant emergent vegetation in both 2012 (2,446 grids) and 2016 (6,500 grids). The wetter conditions leading up to the June 2016 evaluation period appeared favorable for cattail expansion as its dominance increased from 13 to 37% of all vegetated grids in the Moore Haven marsh.”</p>	<p>energy (or sustained, high water levels) cause it to detach and form tussocks.</p>
EF-5	12/19/19	<p><u>Missing References</u> There are a few cases of missing references in the report. The report (Page 2, 2nd paragraph) states that most of the littoral marsh is dried when lake stage are <12 ft. Where is this information coming from? For instance, Havens et al. (2002) states that stages <11.15 ft result in the loss of most of the littoral zone. The 3rd paragraph on page 2 has no reference for the impacts of low lake levels on apple snails. The Darby et al. (2004) article refers to Lake Kissimmee, so what data/evidence is there for the impacts of low Lake Okeechobee levels on apple snails from 2007 to 2008?</p>	<p>We added a reference for lake marsh elevations, but this information has been presented many times over the years in dozens of reports and literature. It is a well-known fact that the marsh occupies approximately the 12-15ft contour, though there are obviously less densely vegetated areas down to considerably lower elevations. The Darby article refers to drought/desiccation impacts to apple snails, which are the same on Lake Kissimmee as they would be on Lake Okeechobee. The statement was about apple snail drought tolerances in general, not a reference to actual, measured impacts on Okeechobee, which have not been measured.</p>
EF-6	12/19/19	<p><u>Penalty Scores</u></p>	<p>The varying nature of the scores are indicative themselves of specific areas of interest. For</p>

		The derivation of the penalty scores are not provided in the description of the metric and appear somewhat arbitrary. If the penalty scores are the consensus of expert opinion, that should be made clear. Alternately, if there are specific zones that the data shows are of particular interest and harm, that information should be cited.	example, penalties jump at 16 ft but are more gradual outside the envelope in August, for example. These variable widths and scores are discussed more in the latest version as indicative of whether thresholds were considered more or less rigid. We also specify that the scores were developed as a working group, based on best available information and expert opinion.
EF-7	12/19/19	<u>Recovery Schedule</u> One new aspect of this performance metric that we find intriguing and of use is the proposed envelope for recovery zones. This recognizes the dynamic nature of the Lake, and is an innovative idea.	Thank you for your comment.
EF-8	12/19/19	Overall, we have great respect for the expert scientific opinion that this performance metric represents. However, given the current focus on Lake Okeechobee and its ecology, it is imperative that the trade-offs that went into the derivation of this performance metric be transparent.	Thank you for your comment.
Audubon Florida (AF)			
AF-1	12/19/19	This proposal updates the existing PM which evaluated lake health as fluctuating between an annual average low level of about 12.5 feet and an average high level around 15.5 feet. This draft PM lowers both those numbers by six inches to make the low and high 12-15 feet, respectively. We note that a stage envelope between 12-15 feet is not a new recommendation, rather a return to the original PM that was described in the Everglades Restudy in 1999.	Thank you for your comment.
AF-2	12/19/19	Lake Okeechobee has experienced frequent high water years since LORS08 was adopted and those negative impacts helped spur a revisit of the 12.5-15.5 metrics. Audubon Florida strongly supports the new revised PM for	Thank you for your comment.

		Lake Okeechobee of 12-15 feet and we thank the Committee for their hard work and commitment to uphold science-based metrics.	
AF-3	12/19/19	Lake Okeechobee's problems are famously long standing, but that has triggered decades of research into what conditions are beneficial or detrimental to the Lake. The draft PM has ample citations from old literature and more recent analysis to justify returning to the 12-15 feet stage-guidance for the "normal" stage envelope. In particular, these levels enhance the health of the Submerged Aquatic Vegetation (SAV) community in the lake, arguably the single most important plant zone.	Thank you for your comment.
AF-4	12/19/19	When thriving, the SAV cover as much as 50,000 acres, cleanse the water therein, provide a buffer from polluted water in the Lake's middle for the 100,000 acre emergent marsh in shallower water, support a world-renowned bass fishery, and provide myriad wildlife benefits. When the SAV are drowned by high water, the plant life disappears and the zone is dominated by polluted water from the Lake's middle that washes into the emergent marsh zone, feeding sprawling monocultures of cattails, and the bass fishery (and fishing) collapses. We support the particular attention to SAV zone health.	Thank you for your comment.
AF-5	12/19/19	The proposed PM has a new feature, a Recovery envelope, in addition to the "Normal" one. Audubon is strongly supportive of this new feature, as it drives ecosystem recovery and allows water managers to exert flexibility when needed as justified by the scientific record built by the committee in this recommendation.	Thank you for your comment.
AF-6	12/19/19	As explained in the document, extreme high levels can eliminate most of the SAV from the lake and once lost, they cannot be recovered until levels drop low enough for sunlight to germinate seeds on the bottom where they grow (the ~9-11 foot contours). Adequate sunlight	Thank you for your comment.

		penetration begins at about 12 feet lake elevation and improves as it goes lower. If no lows are experienced for years, germination does not occur and the impairment also lasts for years. This document accounts for the lag effect and does not return to normal scoring until recovery conditions for the Lake have occurred.	
AF-7	12/19/19	It has come to our attention that many of the public do not understand how PMs are used and have expressed concern that lowering the stage envelope could impact water supply. PMs are not management plans, they are measuring sticks for predicted ecological responses of the Lake under various management scenarios. PMs are only designed for the resource or issue of interest and must accurately reflect how well that resource fares under alternative management scenarios.	Thank you for your comment.
AF-8	12/19/19	Thus, water supply interests have their own PMs that should as perfectly as possible, predict their future conditions under different alternatives, as should estuaries, the Water Conservation Areas and other important parts of South Florida.	Thank you for your comment.
AF-9	12/19/19	To evaluate tradeoffs, it is vitally important that all PMs are accurate for the issue they describe. We recommend the Corps continue to educate the public on these differences and we pledge to do so as well.	The Corps will continue to educate the public on the LOSOM process, and the tools used to evaluate alternatives through PDT and public meetings. This performance measure is just one of the many tools and performance measures that will be used by LOSOM and other CERP projects to score different alternatives. This performance measure focuses solely on the ecology of the lake and what is the preferred stage of the lake for the ecological function of the lake. This performance measure is just one of the many evaluation tools that LOSOM will use to select an alternative.

AF-10	12/19/19	We commend the RECOVER Team for a well-constructed document and improved PMs for our greatest lake.	Thank you for your comment.
United States Sugar Corporation (USSC)			
USSC-1	12/20/19	<p><u>USSC Supports the Comprehensive Everglades Restoration Plan (CERP), including LOSOM's Development as a CERP Lake Operating Manual</u></p> <p>USSC has long supported Everglades restoration and continues this position by actively participating in and supporting LOSOM's development. LOSOM is an opportunity to accomplish all originally authorized Central and Southern Florida Flood Control Project (C&SF Project) purposes and incrementally improve ecologic restoration performance. LOSOM includes several CERP components and, as a CERP operating manual, will synchronize Lake operations with new infrastructure per alternative evaluations based on CERP performance measures. USSC looks forward to implementation of these improved Lake operations.</p>	Thank you for your comment.
USSC-2	12/20/19	<p><u>LOSOM's Alternatives Evaluation Is a Welcomed Opportunity to Accomplish All Authorized C&SF Project Purposes and to Incrementally Accomplish CERP's Objectives</u></p> <p>The LOSOM process is gradually building toward alternatives and evaluation metrics. Corps staff has engaged with the public in a step-wise manner to foster understanding, build relationships, and address alternatives evaluation through appropriate metrics. USSC looks forward to continued participation regarding how the proposed LSE PM will be scored, weighted and applied in comparison to other environmental and non-environmental performance measures. LOSOM's overall scoring of the metrics should help resolve concerns for how</p>	Thank you for your comment.

		LOSOM will reliably improve South Florida water availability and meet all authorized project purposes.	
USSC-3	12/20/19	Together, we are engaged in a multi-decade, multi-billion dollar effort to add storage infrastructure to meet all C&SF Project purposes. LOSOM presents a near-term avenue to accomplish these goals in providing water for originally authorized C&SF Project purposes while incrementally fulfilling CERP's objectives. Based on what is now known about the ongoing LOSOM evaluation process and draft LSE PM, the Performance Measure seems narrowly focused and could favor a lower Lake regulation schedule that may hinder meeting the authorized project purposes. From an overall perspective, having water available in the regional system is necessary. As we understand LOSOM's evaluation process more, we expect the path to accomplishing these purposes will become clearer. More detailed, Technical Comments are attached as Exhibit B for your consideration.	Thank you for your comment.
USSC-4	12/20/19	<u>Request for Greater Stakeholder Involvement</u> We appreciate the Corps providing the opportunity to review and comment on the LSE PM. USSC sees agency transparency and stakeholder involvement as an important component in developing appropriate performance measures. Since inception of the Everglades restoration program, USSC has been at the table, with its respected technical consulting team, working side by side with agency staff and other stakeholders to successfully develop all aspects of CERP. Similar to our position in prior comment letters, without inclusive public meetings to discuss the draft LSE PM and review supporting materials, the 15-day review and comment period offered by RECOVER has made meaningful review difficult. Posting materials online is also helpful and would be appreciated. Unfortunately, we noticed many links with RECOVER's materials are "under construction." We also encourage RECOVER to review the	Thank you for your comment, we will take this into consideration in future PM updates. RECOVER needed to work quickly to meet the LOSOM project schedule

		CERP Programmatic Regulations and more closely follow its procedures, particularly as to public meetings, implementation procedures, and Working Group participants.	
USSC-5	12/20/19	<p><u>Recommendation</u></p> <p>USSC recognizes Lake Okeechobee's ecology and hydrology is complex. Scientific understanding of its physical, hydrological, and biological processes is a work in progress. The Lake is also subject to many overwhelming variables. Rainfall, wind, hurricanes, droughts, extreme drawdowns, vegetation management, muck scraping, variable Lake bathymetry, multiple regulation schedules and planned deviations have all occurred in the last 19 years. Stochastic events, both high and low, directly and dramatically influence the type and extent of vegetation in Lake Okeechobee. These complexities may be best analyzed through LOSOM's development rather than this measure. In the event Lake high water conditions occur, evaluation of overall condition of the Lake's ecology and all related, regional water resource conditions should occur to discern whether or not a temporary planned deviation from the Lake regulation schedule is appropriate.</p>	This will be considered as new information becomes available and will be implemented during future weekly operations meeting between the agency scientists
USSC-6	12/20/19	In the absence of new science and time for appropriate peer review of the significantly modified proposed LSE PM, which proposes two new stage envelopes but relies on the same science as in 2007, USSC recommends continued use of the 2007 Lake Okeechobee Stage Performance Measure.	More explanation and information supporting the modifications to the envelope were added to the latest version, including the 2019 SSR findings and SAV responses to the 2019 lake stages. Further, the original science that supported the earlier envelope actually evaluated lower stages, so this update was essential even to bring it in line with the "old" science.
USSC-7	12/20/19	1. The proposed LSE PM should reflect new science and address uncertainties.	Thank you for your comment.

		Performance measures used for evaluation of alternative operating regulation schedules for existing civil works infrastructure have a heightened role. Upon finalization of the Corps' decision, the C&SF Project will immediately conform operations to the new operating regime; resulting impacts are immediately experienced. Likewise, impact to CERP project planning occurs. Hence, the scientific foundation of the proposed update for the proposed LSE PM, and all other LOSOM performance measures, is crucial and warrants detailed review to minimize uncertainties.	
USSC-8	12/20/19	The draft LSE PM Documentation Sheet does not cite new research, data, technical studies or peer reviewed publications supporting the new lower envelope and recovery envelope. The 2015 University of Florida's Water Institute Final Report to the Florida Legislature discusses Lake stages and notes: "There are not sufficient data to discern whether similar ecological benefits would occur from a yearly range of 11.5 to 15.5 ft or 12.5 to 15.5 (or some other combination of low and high stages)." ¹ The LSE PM and its scoring metric must be supported by science and factor in risks to both recoverable and non-recoverable resources that may occur due to low Lake operations. It appears the existing peer-reviewed science relied upon in development of the 2007 LSE PM is now being reinterpreted, without adequate technical explanation or justification, in either the "normal" lake stage envelope or the addition of a secondary "recovery" lake stage envelope.	We added more references regarding the 12-15 ft range, as well as reviews of lake health from the 2019 System Status Report, and effects of 2019 low lake stages on SAV populations. The benefits of lower stages in offsetting high-water impacts are also well cited and discussed throughout. The 2020 University of Florida's Water Institute Final Report to the Florida Legislature mentions the need for PMs to include information on antecedent conditions, and the timing and duration of events, which is what this effort has done. We also did not reinterpret the old science, but rather adjusted the envelope to better align with that science than the original envelope did. There was no justification in the original envelope as to why it deviated from the cited research, but we added more information as to why we made the specified changes.
USSC-9	12/20/19	2. Over-reliance on a single ecological indicator in development of the proposed LSE PM is proposed.	There may have been confusion about the reliance of SAV over other indicators because there were specific analyses discussed in the

		<p>The National Academies of Science (NAS) 2018 Report to Congress studied a new Lake schedule, considering whether additional storage in the Lake is practicable and discussed related scientific issues. NAS concluded: "Further research is needed to discern with greater certainty how the SAV in Lake Okeechobee responds to changes in water depth and lake level."</p>	<p>document, whereas other indicator requirements simply cited prior studies. We moved the SAV analyses to the appendix to avoid confusion and added more information regarding other indicators and tradeoffs throughout, as well as why SAV is a good indicator for multiple parameters that benefit from low lake stages. We agree more research is needed, which is why we added additional monitoring transects in 2018 and presented findings from the 2019 stage effects in the new Appendix. We also brought in more information from the 2019 SSR to explain why the envelope was adjusted.</p>
USSC-10	12/20/19	<p>We acknowledge that musk grass (<i>Chara</i>) potentially could be used as an indicator for Lake Okeechobee stage management, but should not be the sole plant as a representative of the overall SAV community leads to a skewed interpretation of the stage-SAV cover relationship. The Lake Okeechobee SAV community is comprised of both non-vascular (<i>Chara</i>) and vascular (e.g. <i>Potamogeton</i>, <i>Najas</i>, <i>Vallisneria</i>, etc.) macrophytes. Their distribution is controlled by factors such as substrate type. <i>Chara</i>, for example, occurs primarily on peat, and, as to water depth can tolerate very shallow water levels, and it is one of the first plants to re-colonize in response to rehydration after dry down. By contrast, many of the vascular SAV thrive over a range of substrate types, and often in much deeper conditions (Johnson et al. 2007). Importantly, it is generally acknowledged that the vascular SAV are the most ecologically important to the Lake Okeechobee food web (Johnson et al. 2007, Havens et al. 2005). Vascular SAV</p>	<p>We added more clarity regarding our use of <i>Chara</i> as a surrogate for light penetration in general, and also include some recent vascular SAV analyses to demonstrate expansion in 2019 that was maximal along the drying edge of summer water elevations. Further, the decline in vascular SAV over recent history was one of the factors driving the PM update to more closely match the original research than the earlier PM did.</p>

		species are important to sport fish populations, and may be more resilient to high water and wave action than Chara (Havens et al. 2004). The value of vascular SAV taxa therefore is well-recognized, and built in to current performance metrics on the lake.	
USSC-11	12/20/19	Chara is acknowledged to re-colonize quickly upon rehydration following dry down, but following this initial colonization period, Chara communities in Lake Okeechobee can be replaced over time by vascular SAV species (Havens et al. 2004). Therefore, using Chara coverage as a metric (e.g., Figure 2 in the draft LSE PM document) doesn't necessarily reflect the cover or health of the overall SAV community; indeed, it ignores the vascular species, which are the most desirable components of the community. The relationship between total SAV coverage (not simply Chara) and 30-d min lake stage is provided in Figure 1. Also depicted in this figure is the poor relationship between vascular SAV and Chara coverage.	See above response. Reference to Figure 1 is unclear, only <i>Chara</i> coverage is shown and is clearly stated in the title of the graph and figure caption.
USSC-12	12/20/19	It also should also be noted that "high water" conditions that would trigger use of "Recovery" stage targets need to consider the condition of the overall SAV community, as opposed to just absolute lake stage levels at a given time. Lake Okeechobee SAV (the vascular species, in particular) can thrive under relatively deep conditions (Havens et al 2005), while supporting robust sportfish populations. For example, following back-to-back years of a managed drawdown (stage of 12.1 ft. in 2000) and drought conditions (stage of 9.2 ft. in 2001), it wasn't until a diverse vascular SAV community developed, at lake stages of 14.8 – 16.4 ft., that bass recruitment was high during 2002-2003 (Havens et al 2005). To intentionally draw down the lake to extremely low levels at such a time would be counterproductive to both the SAV and sportfish communities.	We agree that actual lake management conditions should absolutely use information regarding SAV, fishery, etc., to inform decisions. This is an evaluation tool, intended to gauge effects of lake stage in isolation. As for the Havens citation, the vascular SAV recovery referenced took place only because of the low stages in 2001, not despite. Further, many of the vascular SAV areas cited in Havens took place farther upslope than SAV grows under current conditions, since high-water impacts from the late 1990s had reduced the size of the emergent marsh. Therefore the 2004 distribution of SAV after higher stages in 2003 is an outlier in the long-term dataset due to 1)

			<p>low stages in 2000-2002 that caused expansion downslope, and 2) higher stages in 2003 that allowed it to reoccupy locations upslope of where it should have been if not for high-water impacts of the late 90s. Additionally, vascular recovery began well before 2004, as documented in other citations listed in the PM doc. It should also be noted that low water was needed to improve the habitat that fish to reproduce. So technically, the fish did not begin to respond/recover until a few years after the low waters, when the lake was at a higher stage and they could use the habitat that had recovered. This is the importance of interannual variability. Finally, the low stages studied in Havens citation were RECORD low stages at the time, and well below any cited here for recovery. Those levels dried out areas that vascular SAV tend to occupy and occurred after multiple years of high-water impacts.</p>
USSC-13	12/20/19	<p>Please consider the following references and citations in this regard: Havens, K. E., D. Fox, S. Gornak, and C. Hanlon. 2005. Aquatic vegetation and largemouth bass population responses to water-level variations in Lake Okeechobee, Florida (USA). <i>Hydrobiologia</i> 539: 225-237. Havens, K. E., M. C. Harwell, M. A. Brady, B. Sharfstein, T. L. East, A. J. Rodusky, D. Anson, and R. P. Maki. 2002. Large-scale mapping and predictive modeling of submerged aquatic vegetation in a shallow eutrophic lake. <i>The Scientific World Journal</i> 2: 949-965.</p>	<p>All these citations support the work in this document, and we referenced some of them. We included the others to address this comment. The 2017 SFER demonstrated well how the drought in 2011 led to delayed increases in vascular SAV, and showed the beginnings of a several year decline in vascular coverage, which partially drove the review and update of this PM. Great references, thanks for the comment.</p>

		<p>Havens, K. E., B. Sharfstein, M. A. Brady, T. L. East, M. C. Harwell, R. P. Maki, and A. J. Rodusky. 2004. Recovery of submerged plants from high water stress in a large subtropical lake in Florida, USA. <i>Aquatic Botany</i> 78: 67-82.</p> <p>Johnson, K. G., M. Allen, K. E. Havens. 2007. A review of littoral vegetation fisheries and wildlife responses to hydrologic variation at Lake Okeechobee. <i>Wetlands</i>. 27(1): 110-126.</p> <p>South Florida Water Management District. 2017. South Florida Environmental Report Chapter 8B. Lake Okeechobee Watershed Research and Water Quality Monitoring Results and Activities, West Palm Beach, FL. 96 pp.</p>	
USSC-14	12/20/19	<p>3. Proposed Recovery Operations are better suited for a temporary planned deviation appendix in LOSOM instead of a performance measure.</p> <p>The proposed LSE PM contains a brand-new concept – a second, lower Lake stage envelope known as the “Recovery Envelope.” The draft Recovery Envelope seems to actually propose a second lake regulation schedule instead of a performance measure.</p>	<p>The Recovery envelope is simply a slightly different lens with which to view modeled stage outputs than the Normal envelope is. Neither are regulation schedules, and one is no less of a PM than the other. This is also not a new concept, but rather clarifies the low stages that have long been known to benefit lakes and wetlands under duress from high water.</p>
USSC-15	12/20/19	<p>This new metric proposes automatic triggering of extremely low Lake operations, yet other parts of the draft LSE PM Documentation Sheet explain the multiple, negative impacts to lake health due to low stages and science demonstrates lake stages alone do not define the Lake SAV community’s condition. Terms and protocols for this critical operation, if implemented, should be clearly defined and comprehensive. Is there a return frequency? Is an advance assessment of Lake SAV condition performed? What tributary hydrologic conditions exist? How does the Climate</p>	<p>Most of the multiple, negative impacts mentioned were from extreme low stages, though we thoroughly discuss tradeoffs between moderately high and low stages. Further, there are many important factors listed here by the reviewer that would likely be taken into account by lake managers when implementing operations. However, most of these factors are not available for model output evaluations. It is important to remember this</p>

		Prediction Center outlook factor in? Would the protocol be triggered if a La Nina were forecast? What if endangered species had not nested on the Lake the previous year? Are estuarine, stormwater treatment area vegetation condition and treatment capacity and Water Conservation Area conditions considered?	document is not an operation manual but a lens with which to view model stage outputs in terms of their effect on lake health.
USSC-16	12/20/19	The draft Evaluation Protocol is inadequate for LOSOM's modeling purposes. How would the shifting between Normal and Recovery, and back again, be used as a metric evaluating alternative Lake regulation schedules? The Recovery Envelope is not suited for use in LOSOM's alternative analysis as a performance measure and should be deleted from the draft LSE PM Documentation Sheet. The Recovery Envelope proposes to embed in LOSOM a 'subset' or alternative Lake regulation schedule triggered by vague terms and conditions and no effects analysis. The effects of such operations must be thoroughly analyzed and subject to NEPA review that occurs in LOSOM.	The evaluation of this draft envelope update would be no different than the earlier version. In the original and in this draft document, lake stages are simply scored based on how often they are not in the target envelopes and by how far outside the envelope they are. There are simple trigger thresholds that would shift which envelope is being used to score from year to year and is simple to incorporate in the model evaluations. Again, this is not a regulation schedule and is entirely independent of the LOSOM development process.
USSC-17	12/20/19	4. The draft LSE PM should take more care to clearly define key terms. The draft LSE PM should be revised to clearly and consistently define terms. For example, the introduction describes "extreme high stage" as > 17' NGVD and "extreme low stage" as < 10' NGVD. However, throughout the draft Documentation Sheet there are references to "low lake stages" with no defined frame of reference as to what stage is considered "low." Similarly, the term "envelope" is used in several different ways. Lack of clarity makes adequate review and comment difficult; implementation in LOSOM could also be impacted.	Clarified throughout.
USSC-18	12/20/19	5. The draft LSE PM proposes a change in long-standing CERP hypotheses which should be explained.	The earlier version modified the original CERP hypothesis simply to avoid confusing readers that

		<p>It appears there has been a significant change to the CERP Hypotheses. As proposed, the draft LSE PM hypotheses focus only on the frequency of extreme high and extreme low water level stages and no longer includes consideration of the duration of extreme stages. Please explain why this change occurred and provide supporting materials.</p>	<p>it was a reference to specific, earlier, CERP work. We left the hypothesis alone in the latest version to clarify for this and other similar comments. Further, we never proposed changing evaluation of extreme stages, other than not providing a means of relativizing outputs for habitat unit conversion. We assume that's what the reader is referring to, though the original PM also did not consider durations. There are separate evaluation metrics that consider stage thresholds for navigation and MFLs, for example.</p>
USSC-19	12/20/19	<p>6. Scoring Methodology should be explained further and supported by science.</p> <p>The 2007 Lake Stage Performance Measure scoring metric placed heightened importance (i.e. scoring weight) on preventing Lake stage from being high for a prolonged period. The draft LSE PM changes this metric. Please explain the rationale. The 2007 Lake Stage Performance Measure used linear scoring, noting it was the more conservative scoring method until science supporting different scoring was developed. It is unclear what new science supports non-linear scoring.</p>	<p>The current version still places heightened importance on preventing lake stage from being too high or too low, as did the earlier version. We incorporated new info from the 2019 SSR and the best available information regarding stage effects to develop the new scoring methodology. E.g. high water in the growing season has worse impacts than high water in the non-growing season. Flexibility and buffers are important indicators of how heavy or lightly to weigh various stage impacts and were incorporated by varying the scoring slightly around the envelope at certain times of year.</p>
USSC-20	12/20/19	<p>7. Consideration of SFWMD's Lake Okeechobee minimum level is warranted.</p> <p>The performance measure does not appear to include consideration of the Lake Okeechobee Minimum Flow and</p>	<p>There are separate evaluation metrics for things like stages important for navigation, MFLs, etc. This document deals solely with ecological</p>

		Level (MFL) – e.g. “The water level in the lake should not fall below 11 ft NGVD for more than 80 days duration, more often than once every six years, on average.” Please consider including a scoring protocol related to the MFL in the draft LSE PM.	targets. Discussions of extreme low stage impacts, as well as impacts of less extreme lows (like those of the Recovery Envelope) are inclusive of stages similar to those specified by the MFL.
Florida Crystals Corporation (FCC)			
FCC-1	1/8/2020	We appreciate the Corps' clarity that the draft Performance Measure is being prepared pursuant to the Comprehensive Everglades Restoration Plan ("CERP"). The draft Performance Measure Documentation Sheet states that it is a "CERP system-wide performance measure". It was prepared by the Restoration Coordination and Verification ("RECOVER") team, which is the multi-agency team that has been formed to support the objectives of CERP. The news release soliciting public comment also states that "(p)erformance measures are tools to allow managers to assess and evaluate the effectiveness of CERP implementation." It is very helpful to stakeholders such as Florida Crystals to know that this performance measure, and by extension the process to develop the Lake Okeechobee System Operating Manual ("LOSOM"), are being done pursuant to CERP.	Thank you for your comment. This PM was developed pursuant to CERP.
FCC-2	1/8/2020	This is entirely appropriate, because CERP governs restoration activities related to management of Lake Okeechobee. A major goal of CERP was to lower average water levels in Lake Okeechobee to benefit ecological resources there, and also to reduce damaging discharges to the Caloosahatchee and St. Lucie Estuaries. Congress authorized the Corps to take such actions in WRDA 2000, and approved the CERP "as a framework for modifications and operational changes to the Central and Southern	Thank you for your comment.

		Florida Project that are needed to restore, preserve, and protect the South Florida ecosystem while providing for other water-related needs of the region, including water supply and flood protection.' WRDA 2000, § 601(b)(1)(A), Pub. L. No. 106-541, 114 Stat. 2681 (Dec. 11, 2000).	
FCC-3	1/8/2020	The Corps could be more clear about how this draft Performance Measure relates to other Performance Measures. It had been our understanding that Performance Measures such as this one are simply tools that the Corps uses to score different potential alternative water control plans as part of the LOSOM process. There are many performance measures that relate to water management of Lake Okeechobee, including those related to water supply and flood protection. We have assumed that there is no hierarchy for these Performance Measures, and that this one is entitled to any particular weight by the Corps.	This performance measure is just one of the many tools and performance measures that will be used by LOSOM and other CERP projects to score different alternatives.
FCC-4	1/8/2020	However, in the news release inviting public comment, the Corps stated that this draft Performance Measure "has been developed to establish a target stage envelope for the lake." This statement suggests that this draft Performance Measure will establish the range of alternatives that the Corps will consider in the LOSOM process, specifically, that it will only allow for consideration of alternatives that keep lake levels in the target stage. If that is true, then this draft Performance Measure is more than an evaluation tool, but would constitute some kind of legislative rule that predetermines some of the critical choices associated with the development of LOSOM. We note that legislative rules require; notice and comment in the Federal Register to be valid, 5 U.S.C. § 552, and that federal agencies cannot take actions with environmental consequences without following review procedures provided by law. For these reasons, we ask that the Corps' clarify its intentions as to whether this draft Performance Measure will predetermine	This performance measure is just one of the many tools and performance measures that will be used by LOSOM and other CERP projects to score different alternatives. This performance measure focuses solely on the ecology of the lake and what is the preferred stage of the lake for the ecological function of the lake. This performance measure is just one of the many evaluation tools that LOSOM will use to select an alternative.

		the range of alternatives being considered in LOSOM, or whether this remains simply one of many tools to evaluate different proposed operational plans for Lake Okeechobee.	
FCC-5	1/8/2020	Regarding the substance of the draft Performance Measure, we incorporate by reference the comments of other stakeholders concerned about their water supply, such as U.S. Sugar Corp. We add to those comments that the discussion of environmental effects in the draft Performance Measure appears to obscure the real choices being made by the Corps, Lake Okeechobee has marshes at different elevations, so a high stage for one area within the lake may be a low stage for another. Nowhere does the document indicate how many marshes exist at different elevations, so one cannot tell what percentage of the marshes are benefited or hurt by lake stages at any point in the spectrum. For this reason, statements in the draft Performance Measure about light penetration at certain stages, benefits to emergent vegetation from certain water levels, and other similar statements inherently describe benefits to only certain portions of the lake which are not identified. If the Corps proposes to manage Lake Okeechobee to benefit primarily a specific portion of the lake, it should say so. The draft Performance Measure could be improved by providing more specificity on these issues.	We tried to incorporate more specificity regarding various lake stage effects. There is ample discussion about high and low elevation marshes, which are generally thought of as the upper and lower elevations of the marsh, which are roughly 12-15 ft. We include descriptions of approximate marsh elevations, where SAV and lower-elevation emergent marshes are, etc. Further, there are additional descriptions of these in the various literature cited. As described, the envelope is meant to be all inclusive, or the best balance of stages to benefit the entirety of the marsh at the elevations it exists today.
FCC-6	1/8/2020	The draft Performance Measure also could be improved by incorporating a time element. Water levels are always rising and falling in Lake Okeechobee based on weather conditions and Corps management activities. It is inevitable (and appropriate) that water levels may be outside the preferred ecological envelope for some period of time, For instance, lake levels may rise above 15 feet after hurricanes, which serves the flood control function of the Herbert Hoover Dike, and lake levels may fall below 12 feet during droughts, which serves the water supply function of	The time element is indirectly addressed via the scoring methodology; the longer stages are outside, the more accrued points. This, together with the seasonal variation of the envelope itself, we feel incorporates timings and durations related to ecological health.

		the project. This means that the question is not just whether lake stages are within a certain envelope, but for how long and at what frequency, The State of Florida's Minimum Flows and Levels rule establishes a time-element to evaluate impacts on Lake Okeechobee, and we suggest that the Corps include a similar time element In the draft Performance Measure. Otherwise, people may assume that the draft Performance Measure calls for water levels to always be within that desired range.	
Public			
Catherine Dougherty (CD)-1	12/13/19	I am encouraged that the Corp has undertaken a study of the Lake O lake stages and is aware that the lake needs to recover in order to function as a healthy ecosystem (293-295). This report is a good start however the conclusions need clarification, more detail, and the scope should be enhanced.	Thanks for the comment, please stay engaged in the LOSOM projects EIS
CD-2	12/13/19	The authors of the report advocate for a Monitoring and Assessment Approach however do not specify what these are.	We included a discussion of the various agencies and their monitoring efforts that provide the types of data that could be used to update this doc and others in the future. Some of those results were added to the appendix and some were discussed in relation the 2019 SSR. There is no set monitoring or assessment approach defined here, but rather the programs and indicators that exist to inform this and other PMs.
CD-3	12/13/19	Furthermore, remediation or corrective actions are not included in this report. It appears to focus on High and Low water measurements with no mapping of flows in the lake, dead zones, oxygenation sampling, fish population sampling, phosphorous levels, algae and other organisms, toxic chemical concentrations to give a more complete	This PM and others are limited to evaluating model outputs, which for the RSM-BN only include lake stage as a single variable. Weather events would affect each alternative the same, with only stage affecting various health parameters. Further, the literature cited

		picture of the health of the Lake in various regional zones at various depths depending on the seasonality of weather events.	throughout the doc does incorporate a thorough review of many different indicators of health, including many mentioned by the reader, in terms of stage impacts.
CD-4	12/13/19	If other agencies are performing these analyses they need to be included in an enhanced model.	Multiple agencies helped develop this PM using the best available knowledge.
CD-5	12/13/19	Section 6.2 simply says Daily lake stage information but does not quantify what that information is or how manual and automated systems will record and verify this information. Are decisions for water releases to the East and West Coasts of Florida made from this information? Are there automated alarm systems that interface to other systems?	This PM is not a regulation schedule, but simply a lens with which to evaluate modeled stage outputs. The lake stage information mentioned is just model outputs, which this PM will evaluate in terms of probable effects on lake ecology. It does not specify operational rules which will be determined during the LOSOM study, for example.
CD-6	12/13/19	Section 4.3 states that uncertainty is not known or quantified and that linear extrapolations were made of average monthly values. Suggest the Corp hire an army of mathematicians and chemists.	Thank you for your comment.
CD-7	12/13/19	Without verification of the quality of the source data such as location of sampling stations, time of day samples are recorded, correlation to tides, synchronized sampling, sampling error, age of sampling equipment and many other variables it would be difficult to predict or set specific targets for Lake O water levels in various regions of the Lake.	Thank you for your comment.
CD-8	12/13/19	What is the baseline for Lake O water levels?	Unclear as to what this is asking. If the reader is referring to historical water levels, they are irrelevant since there is now a dike that prohibits those stages. If referring to "normal", those vary depending on what regulation schedule is in place. Ecologically, given the

			constraints of the system, we consider 12-15ft as "baseline" or normal conditions in a given year.
CD-9	12/13/19	How is the scoring system in this report effecting policy and operations at Lake O?	This is not a policy document but a performance measure that is specifically developed to assess the health of the Lake relative to model outputs. It does not specify operational rules which will be determined during the LOSOM study.
CD-10	12/13/19	What does a "penalty" really mean?	This term was deleted throughout in favor of "points" or "scores", similar to other PMs.
CD-11	12/13/19	Studies cited in this report are relatively recent starting at the turn of the 21st century (≥ 2000) although historical data is cited from the 1950's and 1970's but not expanded upon. What types of studies data and species were present in the Everglades at Lake O in the 20th century? Perhaps more context from historical data would be helpful to understand what the Corp is trying to accomplish with this RECOVER system?	This PM is not intended as a thorough review of lake historical conditions, but a terse, technical document. As for Lake O ecological "targets", those would be related to what is possible given hydrologic alterations to the system. As for what RECOVER is trying to accomplish system-wide, please see http://www.evergladesplan.com/ for a variety of information, including on Lake Okeechobee.
CD-12	12/13/19	The cited RECOVER dated 2004 is over 15 years old and perhaps should be replaced by a different method.	It is not clear if the RECVOER 2004 reference is referring to the Monitoring and Assessment Plan of the Conceptual Ecological Model. In either case, updating those documents are in RECOVER's 5-year plan.
CD-13	12/13/19	As a member of the public it is apparent that Lake O discharges and environmental devastation have continued with dire consequences. How has the RECOVER program helped the Corp in Florida?	RECOVER provides essential support to the Comprehensive Everglades Restoration Plan (CERP) in meeting its goals and purposes by applying a system-wide perspective to the

			planning and implementation of the CERP. The RECOVER program conducts scientific and technical evaluations and assessments for improving the CERP's ability to restore, preserve, and protect the south Florida ecosystem while providing for the region's other water-related needs. The results of these evaluations and assessments are communicated and coordinated with program/project managers, decision makers, and the public.
Becky Harris (BH)-1	12/17/19	I had 1 of the 6 dogs who became deathly ill from microcystin poisoning from the toxic discharges from lake Okeechobee.	Noted.
BH-2	12/17/19	The changes that the Corps and SFWMD made this year- having more flexibility with the lake levels made all the difference to our community (ST Lucie river area). We had a summer free of toxic discharges.	Thank you for your comment.
BH-3	12/17/19	I have talked about shared adversity. And this past year no one around the lake and in Palm Beach was without water. Crystal clean discharges from Lake O are not good for our estuary. Please continue the lower lake levels in the dry season just prior to the wet season. Having a back yard full of liver and neuro toxins is not acceptable.	Thank you for your comment.