152 FERC ¶ 61,129
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Before Commissioners: Norman C. Bay, Chairman;
Philip D. Moeller, Cheryl A. LaFleur,
Tony Clark, and Colette D. Honorable.

Grand River Dam Authority Project No. 1494-432

ORDER APPROVING REQUEST FOR TEMPORARY VARIANCE

(Issued August 14, 2015)

1. On July 30, 2015, as supplemented August 10, 2015, Grand River Dam Authority (GRDA or licensee) filed a request for a temporary variance from the Article 401 reservoir elevation rule curve requirements at the Pensacola Project. As discussed below, we grant GRDA's request.

I. Background

2. On April 24, 1992, the Commission issued a new license to GRDA for the continued operation of the 105.18-megawatt Pensacola Project, located on Grand Neosho River in Craig, Delaware, Mayes, and Ottawa Counties, Oklahoma.[1] The project, which operates in a peaking mode, includes: a 5,920-foot-long, 147-foot-high dam; a reservoir (Grand Lake); a powerhouse at the base of the dam; and a 1.5-mile-long tailrace and spillway channel in the riverbed below the dam.

3. Grand Lake has a surface area of about 46,500 acres at a pool elevation of 745 feet Pensacola Datum (PD),[2] with approximately 522 miles of shoreline that extends about 66 miles upstream from the dam. Grand Lake is used for multiple purposes including power generation, recreation, wildlife enhancement, and flood control. Dedicated flood storage (the flood pool) is provided between elevations 745 and 755 feet. When reservoir elevations are within the limits of the flood pool, the Tulsa District of U.S. Army Corps

[1] *Grand River Dam Authority*, 59 FERC ¶ 62,073 (1992).

[2] Pensacola Datum (PD) is 1.07 feet higher than National Vertical Geodetic Datum (NVGD), which is a national standard for measuring elevations above sea level. Reservoir levels discussed in this order are in PD values unless otherwise specified.

of Engineers (Corps) directs the water releases from the dam under the terms of a 1992 Letter of Understanding and Water Control Agreement between the Corps and GRDA that addresses flooding both upstream and downstream of Grand Lake.[3]

4. When reservoir elevations are below the limits of the flood pool, GRDA operates the project pursuant to the terms of its license. In order to balance the multiple uses of the reservoir, Article 401 of the license, as amended in a December 3, 1996 order,[4] requires GRDA to operate the Pensacola Project to maintain, to the extent practicable, the following target reservoir surface elevations (the set of elevations being known as a rule curve), except as necessary for the Corps to provide flood protection: [5]

Period	Reservoir Elevation, in Feet (Pensacola Datum)
May 1 through May 31	Raise elevation from 742 to 744
June 1 through July 31	Maintain elevation at 744
August 1 through August 15	Lower elevation from 744 to 743
August 16 through August 31	Lower elevation from 743 to 741
September 1 through October 15	Maintain elevation at 741
October 16 through October 31	Raise elevation from 741 to 742
November 1 through April 30	Maintain elevation at 742.

5. Since the December 3, 1996 Order, and prior to this proceeding, GRDA has applied to the Commission seven times for either temporary variances from, or permanent changes to, the reservoir elevations specified in the rule curve. These applications were either withdrawn by GRDA, denied, or dismissed by the Commission,

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[3] Section 7 of the Flood Control Act of 1944, Pub. L. No. 78-534, 58 Stat. 890, 33 U.S.C. § 709 (2012), directs the Secretary of the Army to prescribe regulations for the use of storage allocation for flood control or navigation at all reservoirs constructed wholly or in part with federal funds. A federal grant provided a substantial part of the funding for the construction of the Pensacola Project.

[4] *Grand River Dam Authority*, 77 FERC ¶ 61,251 (1996).

[5] The elevations in the rule curve were based on recommendations from the Grand/Neosho River Committee, a group formed in 1993 by the offices of U.S. Congressional delegations from Kansas and Oklahoma and consisting of representatives of towns, chambers of commerce, counties, and state resource agencies from Kansas and Oklahoma, the Kansas-Oklahoma Flood Control Alliance, the Neosho Basin Advisory Committee, and lakeshore landowners associations.

with the exception of an application for temporary variance which was approved in 2012 to alleviate drought.[6]

II. GRDA's May 28, 2015 Proposal

6. On May 28, 2015, GRDA filed an application for a temporary variance from the rule curve. GRDA stated that the requested variance would reduce the risk of vessel groundings at Grand Lake in late summer, improve recreation, would generally help to balance competing stakeholder interests, and would provide a cushion against the possibility of late-summer drought. GRDA also asserted that the variance would assist it in managing dissolved oxygen (DO) levels in the river below the project, and at its other projects located downstream[7] in the event of a drought in 2015. GRDA's May 28 application differed from its previous requests primarily by including a 2014 rule curve analysis (2014 Dennis Study). GRDA's May 28 application also included a February 20, 2015 letter from the Corps stating that the 2014 Dennis Study is of high quality and consistent with the previous 1998 Corps flood study and a report dated January 27, 2004, by Dr. Forrest M. Holly Jr. (2004 Holly Study).[8]

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[6] *See* June 26, 2015, Commission staff letter dismissing, for lack of adequate information, May 28, 2015 request for temporary variance to enhance recreational boating and tailwater dissolved oxygen management; July 3, 2013 Commission order denying March 20, 2013 request for temporary variance based on drought forecasts, *Grand River Dam Authority*, 144 FERC ¶ 61,007 (2013), and August 2, 2013 letter denying request for reconsideration; July 25, 2011 Commission staff letter dismissing, for lack of adequate information, April 6, 2011 request for a temporary (two-year) variance to enhance recreational boating; April 4, 2006 Commission staff letter denying March 13, 2006 request for temporary variance to respond to drought conditions, on basis that variance not warranted based on forecasted conditions; June 17, 2004 letter from GRDA withdrawing January 26, 2004 request to permanently amend Article 401 rule curve to enhance recreation, water quality, and wildlife habitat; and August 16, 1999 letter from GRDA withdrawing June 2, 1999 request for temporary variance (for calendar year 1999) to allow for alternative plan for millet seeding.

[7] GRDA also holds licenses for the Markham Ferry Project No. 2183 and Salina Pumped Storage Project No. 2524, which are located immediately downstream of the Pensacola Project.

[8] *Analysis of Effect of Grand Lake Power-Pool Elevations on Neosho River Levels During a Major Flood*, Docket No. P-1494-000 (filed Jan. 29, 2004).

7. Under GRDA's proposal, the temporary variance would only affect the project's rule curve between the dates of August 16 and October 31. Between August 16 and September 15, the reservoir would be maintained at an elevation of 743 feet. Between September 16 and September 30, the elevation would be lowered from 743 to 742 feet. Between October 1 and October 31, the reservoir would be maintained at elevation 742. GRDA's proposed rule curve variance is illustrated in Figure 1 below.

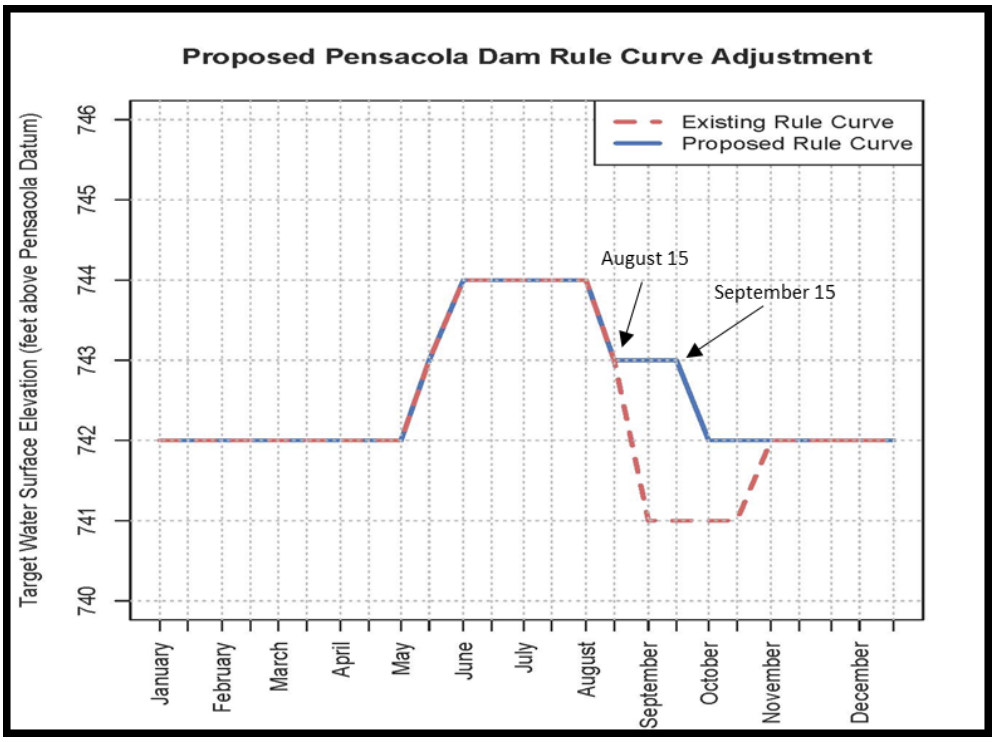

Figure 1: Proposed temporary variance from the Article 401 reservoir elevation rule curve requirements for the Pensacola Project.[9]

8. GRDA also proposed an adaptive management plan to maintain downstream water quality during any drought during the variance period (Drought Adaptive Management Plan) by providing specified releases from the dam to ensure maintenance of DO concentrations in the tailwater area downstream in the event that a drought causes reservoir elevations to fall below the rule curve during the period of the variance. Currently no drought is predicted for the project area.[10] Under its plan, in the event of drought GRDA would make releases equivalent to 0.03 to 0.06 feet of reservoir elevation

[9] GRDA July 30, 2015 Application, Appendix C.

[10] http://www.cpc.ncep.noaa.gov/products/expert_assessment/sdo_summary.html.

per day during the temporary variance period. GRDA stated that these releases would both conserve water in the reservoir and improve downstream DO conditions.

9. Finally, GRDA proposed to implement an adaptive management approach to address major precipitation events that might occur during the temporary variance period (storm adaptive management process). GRDA would: (1) review on a daily basis weather forecasts in the watershed, Grand Lake surface elevation data, U.S. Geological Survey (USGS) gauges upstream of the project, surface elevations at the Corps' John Redmond Reservoir,[11] and other relevant information affecting surface elevations at Grand Lake; (2) provide this information to federal and state resource agencies, local governmental officials, and other interested stakeholders; (3) hold weekly conference calls to discuss current and forecasted Grand Lake surface elevations; and (4) adjust releases at Pensacola Dam as necessary to meet the downstream requirements, while balancing the public interests set forth in Article 401.

10. GRDA provided a draft of its application to federal, state, and local resource agencies, Native American Tribes, elected officials, and municipalities for a 30-day comment period prior to filing it with the Commission. The May 28 application included copies of comments received on the draft.

11. The Commission received comments on GRDA's May 28 application from local stakeholders, municipalities, elected officials, and Native American Tribes. The majority of the comments expressed support for the variance, citing enhanced recreational opportunities and safety for boaters on Grand Lake. However, upstream constituents, the City of Miami, Oklahoma, the Modoc Tribe of Oklahoma, and Larry Bork (on behalf of citizens and businesses located in Ottawa County, Oklahoma) filed comments opposing the application. These comments primarily expressed concern about the increased risk of upstream flooding caused by backwater effects from Grand Lake, and about the inadequacy of the analysis in the application. In particular, the City of Miami asserted that the application failed to provide the studies that the Commission has found to be necessary with respect to prior requests for either temporary variances from, or permanent changes to, the rule curve (including a flood routing study, environmental report, generation analysis, and plan to address stakeholder concerns).[12] In addition, the City of Miami and Mr. Bork alleged that GRDA does not have adequate flowage

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[11] This reservoir is used for flood control and is located upstream of the Pensacola Project.

[12] The City of Miami cites Commission staff's July 25, 2011 letter dismissing, for lack of adequate information, GRDA's April 6, 2011 request for a temporary (two-year) variance to enhance recreational boating.

easements for properties that could be affected by upstream flooding caused by backwater effects from Grand Lake during the proposed temporary variance period.

12. On June 26, 2015, Commission staff issued a letter denying GRDA's May 28 application.[13] While staff acknowledged that the temporary variance would provide some benefits, staff concluded that the application was deficient in the following respects:

> Flood Routing Study. The proposed temporary variance would increase target reservoir elevations by up to two feet from August 16 through October 31. As noted by staff with respect to GRDA's prior applications, during the time period of the proposed variance, high inflows could cause reservoir elevations to rise into the flood pool more frequently, reach higher maximum levels, and remain in the flood pool longer than under the current rule curve. Staff stated that the following comments would have to be addressed in order for staff to evaluate GRDA's proposal:
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> • The analysis in the 2014 Dennis Study only contained a limited set of calibration storms from 2008 to the present. Staff noted that a preliminary review of USGS data shows that there have been multiple storms during the proposed temporary variance period (August 16 through October 31) since 1986 that should be considered for inclusion in a flood routing analysis, and explained that a more robust analysis would be needed before modifying the project's rule curve on either a temporary or permanent basis.
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> • There was no analysis of potential downstream flood effects. A preliminary review of Federal Emergency Management Agency (FEMA) 100-year flood maps indicates that there are homes downstream of the Pensacola Dam within the 100-year floodplain. An analysis was needed to determine effects to property and structures located downstream of the project. In addition, although an upstream analysis was performed, details regarding effects to upstream properties and structures were lacking.
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> • GRDA should specifically address the technical comments from the City of Miami regarding the analysis in the 2014 Dennis Study. Any supporting data and models used in responding to the City's comments, as well as the supporting data and models used to prepare the submitted rule curve study, would have to be provided.

[13] While staff's letter stated that it was denying GRDA's request, staff in fact effectively dismissed the request for lack of sufficient supporting information.

Environmental Report. The application did not include an environmental report. An environmental report was needed so staff could determine if there were any likely concerns or effects to wetlands, upland vegetation adjacent to the shoreline, fish and waterfowl that use shallow-water areas, or whether the proposed temporary variance was likely to affect shoreline erosion and/or shoreline stability. In addition, the environmental report needed to describe whether there would be any expected effects to federally-listed threatened and endangered species in the project area.

Generation Analysis. The application did not include information on average annual generation and the estimated dollar value for that generation for the current operating rule curve and for the proposed temporary variance.

Comments on the Draft Application. A draft application was provided to resource agencies, tribes, and other stakeholders for comment. GRDA provided copies of the comments it received with its final application. However, GRDA did not incorporate, respond to, or otherwise address stakeholder comments.

III. GRDA's July 30, 2015 Proposal

13. On July 30, 2015, GRDA filed a new request for a temporary variance from the rule curve. GRDA incorporates by reference all information contained in its May 28 application. In addition, the new application includes: (1) a letter from four University of Oklahoma Professors responding to questions raised by Commission staff regarding calibration points of the floodplain modeling study and responding to the technical comments of the City of Miami; (2) a July 24, 2015, letter from the Corps commenting on the downstream effects of the proposed temporary variance; (3) an environmental report addressing the effects of the proposed temporary variance, including flooding potential and the anticipated effects to properties and structures; (4) a generation analysis assessing the project's average annual generation and providing an estimated dollar value of the generation resulting from the proposed temporary variance; and (5) a comment/response matrix identifying and responding to the comments filed in response to GRDA's draft and May 28 applications.

IV. Public Notice, Interventions, Comments

14. The Commission issued public notice of GRDA's application on July 31, 2015, and published the notice in the *Federal Register* on August 6, 2015.[14] The notice, which

[14] 80 Fed. Reg. 46,977 (Aug. 6, 2015).

established August 10, 2015 as the deadline for submitting comments, motions to intervene, and protests, was also published in five newspapers in the project area. On August 6 and 7, 2015, the City of Miami filed a motion to intervene and comments opposing GRDA's application.[15] Miami's comments are addressed below.[16] The Commission also received several comments expressing support for the variance, citing enhanced recreational opportunities and safety for boaters on Grand Lake, and additional reserve drinking water supply. On August 12, 2015, GRDA filed an answer to Miami's motion to intervene and comments opposing its July 30 application; and on August 13, 2015, Miami filed an answer to GRDA's August 12 answer.[17]

V. Flood Analysis

A. GRDA's Proposal

15. As noted above, GRDA reiterates its May 28 request, with additional supporting evidence. In support of its request, GRDA relies primarily on the 2014 Dennis Study, which analyzed the upstream flooding impacts, particularly in the area of Miami, that would occur as a result of the proposed rule curve modification. The study determined that the proposed rule curve modification would have a minimal impact on upstream flooding, concluding that the incremental[18] increase in water surface elevations would be less than 0.2 foot[19] at Miami. In its current application, GRDA responds to the matters raised by Commission staff in the June 26 letter and provides additional information

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[15] Timely, unopposed motions to intervene are granted by operation of Rule 214(b) of the Commission's Rules of Practice and Procedure. 18 C.F.R. § 385.214(b) (2015).

[16] The City of Miami complains that the 10-day notice period was not sufficient to respond to GRDA's July 30 application. We disagree. GRDA's July 30 application seeks the same approval requested by its May 28 application, and incorporates all information contained in its May 28 filing. Further, while GRDA's July 30 application does provide some new information, this information is intended to supplement the deficiencies of GRDA's May 28 application. Between the May 28 application and the current application, Miami and other stakeholders have had sufficient notice and opportunity for comment.

[17] Our rules do not permit answers to answers and protests, thus we reject GRDA's August 12 answer and Miami's August 13 answer. *See* 18 C.F.R. § 385.213(a)(2) (2015).

[18] In this order, incremental refers to the change in water surface elevation due to the proposed temporary variance.

[19] 0.2 foot is equivalent to 2.4 inches.

regarding the 2014 Dennis Study that evaluates upstream flooding and a July 24, 2015 letter from the Corps, which states that the proposed temporary variance would have negligible impacts on downstream flooding. In addition, GRDA proposes a storm adaptive management process to address potential effects of major precipitation events during the proposed variance period.

B. 2014 Dennis Study

16. GRDA provided data supporting the 2014 Dennis Study, including: (a) a flow frequency analysis of all major tributaries to Grand Lake; (b) a steady flow HEC-RAS[20] hydraulic model comparing flood levels at Miami; (c) sensitivity analyses for various flow, channel roughness, and downstream boundary conditions (reservoir elevations); and (d) unsteady flow routing of the October 2009 storm for comparison with steady-flow modeling.[21] The study concludes that the proposed rule curve modification would cause a maximum incremental increase of less than 0.2 foot in water surface elevations in the vicinity of Miami during the 100-year storm event. The study did not evaluate flooding impacts downstream of Pensacola Dam.

17. In the HEC-RAS model for the 2014 Dennis Study, the downstream boundary condition (reservoir elevation) was set at a static elevation of either 741 or 743 feet for all model runs. The study recognizes the possible benefit of further evaluation with dynamic reservoir routing, i.e., the reservoir elevation varying due to dam outflows and upstream tributary inflows.

18. Staff's review indicates that the HEC-RAS model for the 2014 Dennis Study contained a number of input data errors (concerning, e.g., bridge deck data,[22] cross section data,[23] and improper ineffective flow areas[24]). While these errors were carried

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[20] HEC-RAS refers to the Corps' Hydrologic Engineering Center's River Analysis System, a software package that allows the performance of one-dimensional steady and unsteady flow, sediment transport, and water quality analysis.

[21] In steady flow conditions, the flow at a location remains constant over time. In unsteady flow conditions, the flow at a location varies over time.

[22] Bridge deck data is the geometric representation of the structure to properly analyze the impact of the structure on flow and water surface elevations.

[23] Cross section data is the geometric representation of the river channel and overbanks at a given location.

[24] Ineffective flow area is the area of a cross section where water is stored, but not actively conveyed downstream.

through for all model runs, thereby possibly negating some impact of the input errors, the errors to some extent call into question the reliability of the modeling results.

C. Other Studies

19. In January 2004, to support a request to modify the reservoir rule curve to a year-round target elevation of 744 feet, GRDA submitted the 2004 Holly Study. The stated purpose of the 2004 Holly Study was to demonstrate that raising the reservoir elevation from 741 feet to levels as high as 745 feet would have negligible to minimal effects on maximum flood elevations in the vicinity of Miami.

20. The hydraulic model used in the 2004 Holly Study to determine the flood elevations in the vicinity of Miami was an unsteady flow model with constant reservoir elevations as the downstream boundary condition. Commission staff did not obtain a copy of the model used in the study; however, the results were available for Commission review. The study quantified the increase in flooding at Miami due to changes in starting reservoir elevation by modeling a severe June 1995 storm event. According to the 2004 Holly Study, raising the reservoir elevation from 742 to 745 feet would cause an increase in water surface elevations of approximately 0.2 foot at the downstream limit of developed areas in the vicinity of Miami. In the vicinity of the upstream limit of Miami, the 3-foot rise in reservoir elevation would cause an increase in water surface elevations of less than 0.1 foot.[25] The 2004 Holly Study did not evaluate water surface elevations downstream of Pensacola Dam.

D. Review

21. In order to review the 2014 Dennis Study and attempt to validate the results, Commission staff performed an independent analysis. Using an unsteady HEC-RAS model and reservoir mass-balance computations, staff simulated fluctuations in the reservoir during the modeled events to take into account actual gate releases and inflows to Grand Lake. For this analysis, Commission staff corrected the model from the 2014 Dennis Study to ensure that it met current hydraulic modeling standards.[26] Because reservoir elevation does not remain constant during flood events, Commission staff also rectified the static reservoir elevations that were used in the 2014 Dennis Study. Commission staff gathered available pertinent data, including, but not limited to, stream flows, reservoir elevations, spillway gate operations, and other data from historic storms to build the input files for the independent verification model. Commission staff also

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[25] 0.1 foot is equivalent to 1.2 inches.

[26] *HEC-RAS Hydraulic Reference Manual* version 4.1, January 2010, and *HEC-RAS User's Manual* version 4.1, January 2010.

extended the model to assess the downstream impacts from Pensacola Dam to the USGS Gage No. 07190500, Neosho River near Langley, Oklahoma (Langley gage).

22. While the 2014 Dennis Study only considered storm events from August 15 to September 15, Commission staff reviewed historic storms during the August 16 to October 31 time period for its independent analysis. Staff selected the October 1986, September 1993, and October 2009 storms for use in the hydraulic verification model since they are large historic storms from the time of year corresponding to the temporary variance. Other storms from the August 16 to October 31 time period were eliminated from consideration due to a lack of data. Staff concluded that historic large spring or early summer storms were not appropriate for this analysis since they occur outside of the proposed temporary variance period.[27] Using flow data from USGS Gage No. 07185000, Neosho River near Commerce, Oklahoma (Commerce gage), along with the FEMA flood frequency curve prepared for that gage,[28] Commission staff determined that the flow recurrence intervals for the Neosho River for the October 1986, September 1993, and October 2009 storm are 17-year, 8-year, and 3-year events, respectively.

23. The 2004 Holly Study and the 2014 Dennis Study did not analyze potential downstream flooding impacts due to the proposed rule curve change. Since flooding is known to occur downstream of the dam, Commission staff determined that an evaluation of the potential impacts from Pensacola Dam downstream to the location of the Langley gage was warranted. Commission staff employed the use of a Corps HEC-RAS model and historic releases from the October 1986, September 1993, and October 2009 storm events to determine downstream effects.

24. The results of the Commission staff independent analysis of the October 1986, September 1993, and October 2009 storm events show the maximum incremental increase in water surface elevation upstream at Miami occurs during the October 2009 storm. The incremental rise, as well as the maximum flood extent, are influenced by various factors such as storm event composition (e.g., path, intensity, duration), storm location, pre-existing watershed conditions, and the topography of the floodplain. In addition, reservoir elevation at the start of the storm event, as well as gate operations during the event, would affect the degree of flooding. The maximum incremental increase is approximately 0.1 foot if the reservoir starting elevation is raised from 741 to 742 feet and approximately 0.2 foot if the reservoir starting elevation is raised from 741 to 743 feet. The maximum incremental increase in water surface elevation downstream

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[27] Generally, storm intensity and duration vary seasonally throughout the year with larger events occurring in the spring and early summer for this river basin.

[28] FEMA, Task Order HSFE06-11-J-0001 for Grand Lake O' the Cherokees Watershed (Nov. 15, 2013).

of Pensacola Dam, at the Langley gage, also occurs during the October 2009 storm event and is approximately 0.3 foot if the reservoir starting elevation is raised from 741 to 742 feet and approximately 0.7 foot if the reservoir starting elevation is raised from 741 to 743 feet.[29]

25. To visually represent the horizontal spread due to the incremental increase in flooding depth due to the October 2009 storm event, Commission staff mapped the results of its independent analysis at Miami and downstream of Pensacola Dam. There are many structures located near or within the inundated areas, but due to the limitations in topographic data, Commission staff could not quantify with specificity the number of structures that could be impacted by the proposed rule curve change.

26. However, review of aerial photography in the vicinity of Miami indicates that there would be increased flooding of 11 structures already flooded. Under October 2009 storm conditions, these 11 structures may be inundated even with a reservoir starting elevation of 741 feet (i.e., the structures are impacted before the incremental impacts of raising the rule curve are realized). An additional 22 structures that are located within a 30-foot horizontal buffer of the inundation zone may be impacted due to the proposed variance.

27. Also, review of aerial photography downstream of Pensacola Dam indicates that there are some structures located near the Langley gage and near the Highway 82 bridge, which is about 0.5 mile downstream of the gage, that could be impacted due to high releases from Pensacola Dam. Results from the modeling for the October 2009 storm event indicate that residences near Highway 82 are impacted by flooding even with a reservoir starting elevation of 741 feet (i.e., the structures are impacted before the incremental impacts of raising the rule curve are realized). Under October 2009 storm conditions, approximately 12 already flooded structures may experience increased flooding due to the proposed variance. An additional 7 structures that are located within a 30-foot horizontal buffer of the inundation zone may also be impacted.

E. Conclusions Regarding Studies

28. The results of the Commission staff's independent analysis for the three historic storms studied indicate that the maximum incremental flooding increase at the City of Miami is approximately 0.1 foot for a reservoir starting elevation of 742 feet and approximately 0.2 foot for a reservoir starting elevation of 743 feet. These results are similar to those in the 2004 Holly Study (approximately 0.2 to 0.1 foot) and the 2014 Dennis Study (less than 0.2 foot). As discussed above, a precise number of additional structures impacted by the maximum incremental increase of 0.2 foot at Miami could not

[29] 0.3 and 0.7 foot are equivalent to 3.6 and 8.4 inches, respectively.

be determined in the vicinity of Miami due to the lack of surveyed structure data (e.g. first floor elevation or lowest adjacent grade to the structure) and the coarseness of the available topographic data. Review of aerial photographic data in the vicinity of Miami indicates that there would be increased flooding of 11 structures already inundated with a reservoir starting elevation of 741 feet. An additional 22 structures that are located within a 30-foot horizontal buffer of the inundation zone could also be impacted.

29. The results of the Commission staff's independent analysis demonstrate that the maximum incremental flooding increase downstream of Pensacola Dam at the Langley gage is approximately 0.3 foot for a reservoir starting elevation of 742 feet and approximately 0.7 foot for a reservoir starting elevation of 743 feet. With the same topographic limitations found in the vicinity of Miami, a specific number of additional structures impacted by the maximum incremental increase of 0.7 foot could not be determined. Review of aerial photographic data indicates that there would be increased flooding of 12 structures already inundated with a reservoir starting elevation of 741 feet. An additional 7 structures that are located within a 30-foot horizontal buffer of the inundation zone could also be impacted.

30. In its February 20 letter, the Corps states that it had performed a peer review of the 2014 Dennis Study and found that it is of high quality and consistent with the previous 1998 Corps flood study and the 2004 Holly Study. Although the Corps acknowledges that a more diverse set of calibration storms would have been preferable, the Corps notes that the results of the 2014 Dennis Study are consistent with previous efforts, and states that it concurred with the findings of that study. In its July 24 letter, the Corps states that it had performed an analysis of the temporary variance and determined that the variance would have negligible impacts on downstream flooding. Furthermore, the Corps states that its model results showed a discharge of around 100,000 cubic feet per second (cfs) while adverse impacts (i.e., flooding) did not begin until 130,000 cfs at the Highway 82 bridge. The Corps also notes that properties outside of existing flowage easements are not affected until the discharge exceeds 230,000 cfs.

31. In its independent analysis, Commission staff quantified the increased physical danger to residents due to the incremental increase in inundation that would occur under the temporary variance. Using procedures from the U.S. Department of the Interior, Bureau of Reclamation, Assistant Commissioner, Engineering and Research Technical Memorandum No. 11 (ACER 11), Downstream Hazard Classification Guidelines (December 1988), Commission staff analyzed the structures upstream at Miami, and found no increase in danger.[30] Since many inundated structures are located at the edge of

[30] The ACER 11 procedure describes the danger posed to inundated structures based on flood depth and velocity.

the inundated area where flood depths are minor and the incremental flooding impacts are minimal, the increase in the probability for risk to human life is negligible at Miami.

32. Commission staff also analyzed the structures downstream of Pensacola Dam and found some increased danger for various structures. However, for each structure, the downstream danger increase remains within the same ACER danger zone and would be mitigated by the existing Emergency Action Plan (EAP) procedures. Pursuant to its EAP, GRDA uses Blackboard Connect, a reverse 911 system, to notify downstream residents of high flow conditions and non-dam-failure emergencies. Due to the heightened awareness of storm impacts during the proposed temporary variance, if GRDA is extremely proactive in its adaptive management procedures, via the use of technical experts to continually assess the potential for any storm event, and reacts quickly by notifying downstream residents using the established EAP procedures – as we expect it to be – there would be little increase in the probability of human risk.

33. The City of Miami's August 6 comments argue that GRDA has not conducted a flood routing study that sufficiently evaluates the effects of raising the reservoir on upstream and downstream flooding. Specifically, the City expresses concerns with the study time period and the constant reservoir elevations used in the 2014 Dennis Study. The City also contends that a 1998 Corps flood study and the 2004 Holly Study have been provided to the Commission previously, but have never been deemed satisfactory to support a rule curve change. As discussed above, since the 2014 Dennis Study only considered storm events from August 15 to September 15, Commission staff used historic storms that occurred during the entire proposed temporary variance time period for its independent analysis. Commission staff also rectified the static reservoir elevations that were used in the 2014 Dennis Study by using varying reservoir elevations in the modeled historic storm events. Even with these enhancements, the resulting incremental increase in flooding at Miami was similar to that found in the 2014 Dennis Study. Further, Commission staff did not rely on the 1998 Corps flood study or the 2004 Holly Study. Rather, these two studies were reviewed by Commission staff and their results were compared to the 2014 Dennis Study and Commission staff's independent analysis. All study results were found consistent and did not show a significant risk of substantial increased flooding.

F. <u>Storm Adaptive Management</u>

34. GRDA proposes to supplement its operation management throughout the temporary rule curve variance period by using the storm adaptive management process in anticipation of and during potential major precipitation events. While adaptive management is potentially beneficial for project operations, without established rules and protocols, these measures could possibly exacerbate flooding conditions. Alternatively, releasing flows from the reservoir in anticipation of a storm event that does not occur could possibly result in an undesirable lower reservoir elevation for an extended period, depending upon natural inflows.

35. In order to implement an effective adaptive management or pre-release process for the short time period of the temporary variance, the storm adaptive management process should include the following: (1) within seven (7) days of the issuance date of this order, GRDA should file with the Commission a list including contact name, phone number and email address, of all entities participating in the adaptive management process; (2) GRDA should retain technical experts, with extensive knowledge of the meteorology of the area and the hydrology and hydraulics of the basin and dam, to participate in this process in order to answer questions and provide technical assessments of the current conditions and the impacts on the river basin and dam; (3) GRDA should review, at minimum, on a daily basis weather forecasts in the watershed, Grand Lake surface elevation data, U.S. Geological Survey gages upstream and downstream of the project, surface elevations at the upstream and downstream reservoirs, and other relevant information affecting surface elevations at Grand Lake; (4) GRDA should hold conference calls weekly, or more frequently as needed, to discuss the information in number (3) above and any other relevant information; (5) GRDA should provide the information to federal and state resource agencies, local government officials, Commission staff, and interested stakeholders including the Corps, City of Miami, U.S. Fish and Wildlife Service, Oklahoma Water Resources Board, and Oklahoma Department of Wildlife Conservation one day prior to the weekly call or as is practicable before any predicted storm event; (6) GRDA should determine, in consultation with the Corps, whether to initiate pre-releases; (7) GRDA should notify all participants to the storm adaptive management process of any decision to initiate pre-releases; (8) if GRDA initiates pre-releases, it should use the existing operating guide,[31] adjusted for the temporary variance, to lower the reservoir via generation and/or spillway gate releases taking into account upstream and downstream impacts; (9) GRDA should continue its in-place Emergency Action Plan protocol[32] for notification of downstream residents during high flow events; and (10) within five (5) days of any conference call, GRDA should distribute, via email, reports containing meeting minutes from the conference call to all participants, and should file copies of the reports with the Commission, including any comments.

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[31] GRDA maintains operating guides to direct staff as to operation of the project's powerhouse and spillway gates.

[32] An Emergency Action Plan is a formal document that identifies potential emergency conditions at a dam and specifies preplanned actions to be followed to minimize property damage and risk to human life. The Emergency Action Plan describes actions the dam owner will take to moderate or alleviate a problem at the dam, as well as actions the dam owner, in coordination with emergency management authorities, will take to respond to incidents or emergencies related to the dam.

36. The storm adaptive management process should be robust enough to consider unpredictable circumstances such as the failure or malfunction of stream gages, spillway gates, or turbine-generator units. Other factors that can impact the adaptive management operating decisions include pre-existing watershed conditions such as soil moisture content and storm event composition (e.g., path, intensity, duration). The storm adaptive management process should be implemented in consultation with federal, state, and local agencies and other stakeholders, and must involve the stakeholders in decision making.

VI. Environmental Analysis

37. Commission staff reviewed the environmental effects of GRDA's proposed temporary variance. In general, staff found that the proposed variance would result in little or no environmental effects and would have some benefits, particularly increase of water levels for recreation and boater safety and maintenance of adequate DO downstream of the project should drought conditions occur. The proposed temporary variance would not cause Grand Lake to exceed its normal fluctuation range (741 to 744 feet), and would reduce the overall fluctuations within that range. Further, given the short term nature of the variance, Commission staff did not find significant effects to geology and soils or cultural/historic resources; these resources are not discussed further. Other staff resource findings are summarized below.[33]

A. Water Quantity

38. Grand Lake has a surface area of 46,500 acres at an elevation of 745 feet, with approximately 522 miles of shoreline. The Pensacola Project releases water from Grand Lake through generation to target elevations along the Article 401 rule curve, except during flood events, when gates on the Pensacola dam are operated at the direction of the Corps. During the summer and fall, specific release rates are used to maintain downstream DO in order to meet Oklahoma water quality criteria in the tailrace area while also targeting the elevations on the rule curve. GRDA also manages releases from the dam to provide water to operate its downstream Markham Ferry Project and mitigate low DO concentrations below that project, and to support operation of its Salina Pumped Storage Project. The Salina Pumped Storage Project is used to maintain regional energy

[33] The information on existing environmental resources in this section comes from the Environmental Report contained in GRDA's application and from published environmental assessments that staff has produced in support of previous proceedings: (1) for relicensing the Salina Pumped Storage Project located just downstream of the Pensacola Project issued November 4, 2014; (2) for approving the Shoreline Management Plan for the Markham Ferry Project also located just downstream of Pensacola issued April 30, 2014; and (3) for approving the Shoreline Management Plan for the Pensacola Project issued August 14, 2009.

reliability. Local municipalities withdraw water from both Grand Lake and Markham Ferry's Lake Hudson.

39. The licensee's proposal would allow it to store more water in the reservoir during the late summer and early fall period. This would provide GRDA with more water for making releases to maintain downstream DO during this period, as described in Water Quality, below, while maintaining reservoir elevations targeting the rule curve and protecting recreation, water supply and other beneficial uses. As noted above, the Mayor of the City of Tulsa filed comments in response to the Commission's public notice of GRDA's July 30 application, indicating his support for the temporary variance because the variance would allow GRDA to retain additional drinking water in reserve for the City of Tulsa. The city uses the Markham Ferry Project's Lake Hudson as its sole back-up water supply in the event of an emergency.

B. Water Quality

40. Existing water quality at the project is affected primarily by heavy recreational use and shoreline development on Grand Lake. Grand Lake has been recently listed on Oklahoma's 303(d) list[34] for organic enrichment/low dissolved oxygen levels, and color. The beneficial uses for Grand Lake waters, as designated by the state of Oklahoma, include public and private water supply, protection of fish and wildlife, irrigation, and recreation. GRDA currently works to mitigate water quality issues through lake-wide sanitation regulations, shoreline use classifications and management of shoreline development, water quality monitoring, and other measures included in its approved Shoreline Management Plan.[35]

41. The licensee's proposal would not have any significant effects on water quality in Grand Lake, and may provide minor benefits to lake water quality through reducing shoreline erosion that may be associated with the normal elevation changes and exposure of shallow areas. Any reduction in such erosion would reduce turbidity in near-shore areas, and could reduce exposure and suspension of pollutants in sediment, such as heavy metals.

42. During normal project operation, water quality downstream of the project is dependent on releases from Pensacola dam, especially in late summer and fall. During that period, downstream releases are managed to maintain Oklahoma water quality

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[34] The 303(d) list waters are those identified by the state pursuant to the Clean Water Act as having impaired or threatened water quality.

[35] *Grand River Dam Authority*, 145 FERC ¶ 62,041 (2013).

criteria for DO in the tailrace area pursuant to plans approved under license Article 403.[36] In the past, before institution of the program now used to manage releases to maintain downstream DO, low DO concentrations in the tailrace area have resulted in fish kills.

43. The additional water that would be stored in Grand Lake under the licensee's proposal would help ensure water is available for making releases to maintain downstream DO concentrations during normal operation. Additionally, the licensee's proposed Drought Adaptive Management Plan would help to maintain downstream DO concentrations in the event that drought conditions cause reservoir elevations to fall below the rule curve during the variance. Under the Drought Adaptive Management Plan, the licensee would make releases equivalent to between 0.03 and 0.06 foot of reservoir elevation per day. These releases would be equivalent to approximately 175 to 837 cfs per hour over a 24-hour period.[37] The licensee indicates that these releases should also help it to have sufficient water to maintain flow releases to maintain DO below its downstream Markham Ferry Project while maintaining lake elevations necessary for the reliable operation of its Salina Pumped Storage facility. While approval of the licensee's Drought Adaptive Management Plan would help to ensure maintenance of downstream DO concentrations in the event of a drought during the variance period, the plan lacks certain elements necessary for its success. For example, the plan does not specify the drought conditions that would trigger the use of the plan, or that would trigger its conclusion. The missing elements can be taken from the drought management plan that was approved as part of the drought-based variance approved in the Commission's August 15, 2012 order.[38] We identify these elements in the Discussion section below and modify the licensee's Drought Adaptive Management Plan so that it would be effective for use during the 2015 temporary variance.

44. Downstream water quality could be affected by the temporary variance in the event that flood flows need to be released by the Pensacola Project during the variance period. Flood flow releases could cause downstream river bank erosion, resulting in increases in water turbidity. However, it is unlikely these effects would be significant.

45. We find that downstream water quality should not be negatively affected by the licensee's proposed variance, and that it could help to ensure water is available for releases normally made in late summer and fall to maintain downstream DO. If a severe

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[36] *Grand River Dam Authority*, 151 FERC ¶ 62,098 (2015).

[37] This approximation of flow rates for the proposed releases was provided by GRDA in its July 24, 2012 variance request, which was approved in the August 15, 2012 order.

[38] *Grand River Dam Authority*, 140 FERC ¶ 62,123 (2012).

to exceptional drought occurs during the variance period, approval of the licensee's proposal for maintaining downstream DO, with additional elements as included in the approved 2012 drought management plan, could provide significant environmental benefits.

C. Fisheries and Aquatic Resources

1. Grand Lake

46. Grand Lake supports a robust warm water fishery, with populations of largemouth and smallmouth bass, white bass, striped bass and hybrid striped bass, crappie, sunfish, catfish, paddlefish, and a number of species of suckers, minnows, and darters. Grand Lake is one of the top bass fishing destinations in the nation, consistently attracting national fishing tournaments. Largemouth bass, and many of the other sport fishes present, spawn in springtime in relatively shallow waters, and their young use shallow water areas with aquatic and emergent vegetation or other structure as primary habitat through the summer and fall. Clearly, the current water elevation regime under the rule curve adequately supports these seasonally-important fish habitats at Grand Lake.

47. Under the licensee's proposal, late summer and fall water elevations in Grand Lake would fluctuate less. The normal elevation for late fall, winter, and spring would be reached two weeks earlier and therefore would be maintained slightly longer before it is raised again in spring 2016. This change could have minor positive effects on shallow-water fish and waterfowl habitat, in part by protecting emergent and aquatic plants that become established in such areas. It is not possible to predict effects to fish or other aquatic resources that could occur from any increases in flooding under the licensee's proposal, or effects of the licensee's proposed storm adaptive management process.

2. Downstream

48. The tailrace area below the Pensacola Project supports a popular fishery that includes many of the species found in Grand Lake, and this fishery depends on water releases from Pensacola Dam. As described above under Water Quantity and Quality, the licensee's proposal would allow it to store more water during the late summer and early fall period for releases to maintain downstream DO, which would benefit the fishery below the dam. Approval of the licensee's proposal, including its proposed Drought Adaptive Management Plan for maintaining downstream DO in the event of a severe to exceptional drought that causes the reservoir to fall below the proposed rule curve, would further provide protection of downstream fisheries. It is not possible to predict effects to downstream aquatic resources that could occur from any increases in flooding under the licensee's proposal, or effects of the licensee's proposed storm adaptive management process.

D. Terrestrial, Wetland, and Wildlife Resources

49. Terrestrial habitats around Grand Lake generally include coniferous and deciduous upland forests, cropland, pasture, and grassland/savannah. Most of this habitat, approximately 61,462 acres, occurs above 755 feet. At elevations of 735 to 745 feet around the perimeter of Grand Lake, there are approximately 7,274 acres of bottomland forests and 6,438 acres of wetlands, including emergent wetlands, scrub/shrub wetlands, mudflats, and ponded water.[39]

50. Wetland areas primarily occur along the northern and western shores of the reservoir. Emergent wetland vegetation in these areas is primarily composed of herbaceous plants, with black willow, eastern cottonwood, and silver maple also present. Game animals that inhabit the lake shoreline, wetlands and adjacent areas include rabbit, squirrel, quail, mourning dove, whitetail deer, geese, and several species of ducks. Several waterfowl species overwinter at Grand Lake, using the lake, shoreline, and wetland areas for habitat and feeding.

51. In some years, the licensee seeds millet on up to 1,000 acres of mud flat areas in Grand Lake between September 1 and mid-October, to benefit shallow-water waterfowl and fish habitat in accordance with its Fish and Waterfowl Habitat Management Plan, which was approved in 2003.[40] Millet seeding has been a contentious issue in the Grand Lake area for a number of years, because the period of low water elevations, which coincides with millet seeding, also coincides with the late summer boating and recreation season. Under the Fish and Waterfowl Habitat Management Plan, millet may or may not be seeded in a given year based on water levels and other factors, as determined each year by a Fish and Wildlife Technical Committee that was created as part of the plan.[41] Since 2003, the committee has only attempted millet seeding in several years, and the seeding that has occurred has resulted in only limited seed germination and plant growth adequate to benefit waterfowl and fish. Millet seeding was last attempted in 2011, and cannot currently be considered a significant factor in the natural resources of Grand Lake.

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[39] This information is approximate because it reflects conditions prior to the current Article 401 rule curve that was established in 1996.

[40] *Grand River Dam Authority*, 103 FERC ¶ 62,102 (2003).

[41] Annual millet seeding was mandatory under requirements of the 1992 project license. Under the Fish and Waterfowl Habitat Management Plan, it became optional, and as noted, is now performed at the discretion of the Fish and Wildlife Technical Committee.

52. Implementation of the temporary variance in 2015 would not affect any terrestrial or wildlife resources located above normal reservoir rule curve elevations. The variance would not likely cause any negative impacts to wetland or wildlife resources located at and below normal reservoir rule curve elevations, because water levels would remain within the range of the current rule curve and may provide minor, short-term benefits by reducing the water level fluctuations that occur under the current rule curve, allowing some degree of increased growth and establishment of riparian and shallow-water vegetation, which could benefit both fish and wildlife that utilize these areas. The variance would eliminate the exposure of any mud flats for millet seeding in 2015, but, as noted, millet seeding has not been conducted in several years.

E. Threatened and Endangered Species

53. Several federally listed species occur at the Pensacola Project. The gray bat (*Myotis grisescens*) and the Neosho mucket (*Lampsilis rafinesqueana*) are listed as endangered, while the Ozark cavefish (*Amblyopsis rosae*) and the Neosho madtom (*Noturus placidus*) are listed as threatened.

54. Gray bats use two caves that are located in the Grand Lake project area: Beaver Dam Cave and Twin Cave. The Beaver Dam Cave is located adjacent to Drowning Creek, a tributary of Grand Lake and the Twin Cave is located more than a mile from Grand Lake. Of these, only the Beaver Dam Cave has been historically affected by lake levels in Grand Lake (Twin Cave is located at elevation 840 feet, well above the elevation affected by Grand Lake).

55. Inundation of the Beaver Dam cave begins when Grand Lake reaches 746 feet and the primary cave entrance becomes totally obstructed when Grand Lake reaches 751 feet. Between elevations 756 and 757 feet the cave will completely fill with water, drowning any bats inside. Bats in the cave can only survive one or two days without food due to the high energy demands of raising young from May through August. In addition, if adults are trapped outside of the cave, the young can also die. Further, the stress of being trapped can also result in aberrant behavior, causing bats to fall into the water. However, according to information filed with the Commission,[42] the Nature Conservancy and GRDA slightly enlarged (0.45 meter wide by 0.6 meter high) a high passage area near the entrance of Beaver Dam Cave in 2008 and 2013. This work improves the bats' ability to access Beaver Dam Cave during periods of high water. Nevertheless, annual surveys of gray bats have been conducted at caves within the project area including Beaver Dam Cave since 2007. Based on these surveys, most bats vacate the cave by mid-August.

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[42] Annual Report for Article 405: Gray Bat Compliance Plan of the Pensacola Project, filed June 6, 2013.

Only in one 2007 survey were bats found to remain in the cave through August and into September.

56. No effects on gray bats are expected as a result of the proposed temporary variance because during non-flood conditions Grand Lake would only reach 743 feet, which is well below the elevation at which access to Beaver Dam Cave would be impeded. During flood conditions, the temporary variance is expected to incrementally increase water levels upstream of Pensacola Dam and therefore at Beaver Dam Cave. However, because gray bats generally leave the cave by mid-August and because higher passage exits have been created in the cave, it is likely any bats remaining in the cave during a flood event would be able to escape. Therefore, the proposed temporary variance is not likely to adversely affect gray bats.

57. The Neosho mucket is a freshwater mussel native to streams and rivers, lives in nearshore habitat, and does not occur in inundated areas (i.e., lakes and ponds). Critical habitat for this species has been designated in the Elk River and in the vicinity of Grand Lake; however, areas designated as critical habitat occur only in stream channels and not in areas inundated by lakes or reservoirs. Because the proposed temporary variance would not inundate any new areas during non-flood conditions and would only result in minor incremental inundation during flood events, the temporary variance is not expected to affect the Neosho mucket.

58. The Ozark cavefish is a small fish with no eyes or pigmentation and lives strictly in subterranean waters. The Ozark cavefish is found in Jailhouse Cave and Twin Cave found near Grand Lake. As mentioned before, Twin Cave is located well above the elevation of Grand Lake and would not be affected by the temporary variance. Likewise, Jailhouse Cave, which is located downstream of the dam on Summerfield Creek, is also outside the area influenced by Grand Lake. Therefore, the proposed temporary variance would not affect the Ozark cavefish.

59. The Neosho madtom is a small catfish that feeds at night on the bottom of rivers and streams. The madtom only occurs within a 14-mile reach of the Neosho River well upstream of Grand Lake near the Oklahoma/Kansas state line. Neosho madtom habitat is periodically affected by the operation of several Corps flood control structures on the Neosho River. As is the case with the other species discussed above, the Neosho madtom would not be affected by the temporary variance during non-flood conditions. During flood conditions, an incremental increase in water surface elevations upstream of Pensacola Dam would not affect this species.

60. In its comments on GRDA's application for a temporary variance, the U.S. Fish and Wildlife Service (FWS) says, "[t]he proposed temporary variance is not likely to adversely affect federally-listed species, because the listed bats do not typically use

Beaver Dam Cave in late August and should not be affected by any added flood risk."[43] FWS does not raise any issues regarding threatened or endangered species. Therefore, no further consultation is needed pursuant to the Endangered Species Act.

F. Recreation Resources

61. Grand Lake is a major recreation resource in northeastern Oklahoma, providing over a million recreation user days during 2014. Boating, fishing, and waterfowl hunting are popular recreation activities conducted on the lake. Recreational access to Grand Lake is provided through public, commercial, and private facilities such as boat ramps, marinas, and boat docks. Grand Lake has 22 public boat ramps, 439 private boat ramps, and 53 commercial boat ramps, and has a total of 11,782 boat slips (4,021 are available at commercial marinas whereas 7,761 are located at private residential boat docks).

62. Boating on Grand Lake occurs year-round, although the primary recreation season extends from April 1 until October 1. Fishing is a year-round activity on Grand Lake and an average of 117 fishing tournaments were held at the lake each year over the past five years. Waterfowl hunting occurs from September through January primarily in the riverine (i.e., uppermost) sections of the lake. Under its approved recreation plan, GRDA's Lake Patrol is responsible for law enforcement, dock inspections, response to pollution complaints, and marking obstructions and shallow areas in the reservoir. Hazards that lead to boats running aground exist more often at lower lake levels. According to information GRDA included in its May 28 application, in 2013-2014, nearly 80 percent of all boat groundings during the high recreation season (May 1 until September 30) occurred while the lake was being drawn down or maintained at elevation 741 feet.[44]

63. Granting a temporary variance to the project's rule curve would allow the licensee to maintain reservoir elevations 2 feet higher from August 15 to September 15, and up to 1 foot higher from September 15 to October 31. These higher reservoir elevations would increase the amount of area available for boating in the reservoir,[45] and would

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[43] Letter from Jonna Polk, FWS, to Daniel Sullivan, GRDA, dated June 29, 2015, filed with the July 30, 2015, application for variance.

[44] In 2013, 73 percent (*i.e.*, 8 of 11 reported incidents) of all reported boat groundings occurred after Labor Day, whereas 19 percent (*i.e.*, 4 of 21 reported incidents) of the boat groundings in 2014 occurred after Labor Day.

[45] In its December 23, 1985 license application, GRDA estimates that each additional foot of water surface elevation (*e.g.*, an increase from 741 to 742 or 742 to 743 feet) results in an additional 1,000 acres of surface area at the lake.

likely allow for easier public and private access at the numerous boat ramps and boat docks located at the project.[46] Because the increase in area available for boating and improved recreational access would occur during the recreational boating season, the proposed rule curve amendment would result in benefits to recreation at the project.

64. In addition to the above-stated benefits to the recreational boating experiences, the higher reservoir elevation would also likely decrease boating hazards in the reservoir. Based on the licensee's provided data, the vast majority of boat groundings during the high recreation season occur during the tail end of the season when recreational boating use is still high but the reservoir level is being lowered to or is at 741. Thus, we expect the proposed rule curve to contribute to a decrease in boat groundings at the project.

65. With regard to waterfowl hunting opportunities at the project, as discussed above, GRDA's millet seeding program to improve habitat for wildlife, including waterfowl, has not been effective. While the proposed rule curve variance would preclude millet seeding efforts in 2015, the proposed variance could result in some positive effects to waterfowl and waterfowl hunting by providing more stable water levels in the fall.

VII. Generation Analysis

66. Using data from 2006 through 2014, GRDA evaluated the effects of the proposed temporary variance on generation at the Pensacola Project and its downstream Markham Ferry Project.[47] Under the existing rule curve, historic generation at the Pensacola Project between August 16 and October 31 averaged 66,077 megawatt-hours (MWh) with a value of $2,167,000. Generation at the Markham Ferry Project averaged 35,355 MWh with a value of $1,153,000.

67. The proposed temporary variance would not result in a substantial change to generation at Pensacola. The energy generated by lowering Grand Lake from elevation 743 to 742 would be shifted in time from late August to late September. The energy generated by lowering the lake from elevation 742 to 741 would be off-set by the energy "lost" or not generated during Grand Lake's refill (back up to 742) toward the end of October. However, because energy generated in late August is more valuable than

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[46] In its August 10, 2015 supplemental filing, GRDA reported that at 741 feet, 170 private docks are unusable (i.e., the lake-side of the dock is entirely on dry land). GRDA notes that an additional unquantified number of docks would be adversely affected at 741 feet surface elevation (i.e., although not necessarily on dry land, many docks may experience low water and may not be available for boat launching or retrieving).

[47] Markham Ferry's generation is dependent upon the timing and volume of releases from the Pensacola Project.

energy generated in late September, there would be a net loss of $132,000 in the value of the generation at Pensacola during the temporary variance period.[48]

68. At the downstream Markham Ferry Project, the proposed temporary variance would result in an estimated loss of about 123 MWh in generation, which has a value of about $58,000.

69. In summary, GRDA estimates that the temporary variance would result in a total loss of approximately 123 MWh of generation and would have a total cost of about $190,000.

VIII. Discussion

70. As discussed above, we agree that the proposed temporary variance would have some benefits, including increased water levels, greater access for boaters and other recreationists on Grand Lake, improved boating conditions with fewer groundings during the late summer, an extended recreation season resulting in more economic activity in local communities, and improved DO conditions downstream of the project should there be a drought. Further, as discussed above, there would be no significant environmental impacts associated with the proposed variance and relatively little generation lost due to the variance. However, notwithstanding these benefits, the proposal could potentially exacerbate flooding both upstream and downstream of the project during any flood events. As explained above, based upon Commission staff's independent analysis of three historic storm events (October 1986; September 1993; and October 2009), the proposed temporary variance would increase flood elevations by up to 0.2 foot in the City of Miami and up to 0.7 foot downstream of Pensacola Dam at the Langley gage. Given the presence of certain low lying structures at the City of Miami and near the Langley gage, a flood event could potentially impact additional homes and businesses that would have been unaffected absent the proposed temporary variance. Commission staff also concluded that using ACER 11 provides a reasonable assessment of the incremental increase in danger due to the proposed temporary variance and shows that additional flooding would not pose a risk to human life.[49] In addition, the proposed temporary variance would result in a total loss of approximately 123 MWh of generation at the project.

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[48] According to GRDA's analysis, the head differential of up to two feet during the period of the proposed temporary variance would have a negligible effect on generation relative to the overall head available at Pensacola Dam and no effect on the value of that generation.

[49] FEMA, Federal Guidelines for Dam Safety (1998): Selecting and Accommodating Inflow Design Floods for Dams (FEMA 94).

71. GRDA proposes to ameliorate the risk of upstream and downstream flooding during the proposed temporary variance period through use of its storm adaptive management process.

72. GRDA generally describes its plan as being to "adjust releases at Pensacola Dam" in anticipation of a major precipitation event. We interpret this plan to be a "pre-release process," whereby GRDA would monitor storm forecasting and could release water stored in Grand Lake to lower the reservoir prior to the arrival of an oncoming storm. Staff's flooding analysis determined that a storm adaptive management process could be beneficial, if GRDA is able to forecast and implement pre-releases effectively. However, inaccurate forecasting or ineffective management by GRDA could result in Grand Lake being lowered unnecessarily or could cause an increase in upstream and downstream flooding due to failure to timely implement pre-releases. It is also possible that downstream water levels would not permit pre-releases from Grand Lake prior to arrival of an oncoming storm.

73. Notwithstanding the above concerns, if managed correctly, GRDA's proposed storm adaptive management process could ameliorate the risks posed by the temporary variance, and therefore, under Ordering Paragraph (B) we require GRDA to implement its storm adaptive management process while the proposed temporary variance is in effect.[50] The storm adaptive management process should include the following: (1) within seven (7) days of the issuance date of this order, GRDA should file with the Commission a list including contact name, phone number and email address, of all entities participating in the adaptive management process; (2) GRDA should retain technical experts, with extensive knowledge of the meteorology of the area and the hydrology and hydraulics of the basin and dam, to participate in this process in order to answer questions and provide technical assessments of the current conditions and the impacts on the river basin and dam; (3) GRDA should review, at minimum, on a daily basis weather forecasts in the watershed, Grand Lake surface elevation data, U.S. Geological Survey gages upstream and downstream of the project, surface elevations at the upstream and downstream reservoirs, and other relevant information affecting surface elevations at Grand Lake; (4) GRDA should hold conference calls weekly, or more frequently as needed, to discuss the information in number (3) above and any other relevant information; (5) GRDA should provide the information to federal and state resource agencies, local government officials, Commission staff, and interested

[50] In its August 6 comments, the City of Miami contends that adaptive management will not ameliorate the risks posed by the temporary variance, because GRDA has refused to release water stored in Grand Lake prior to the arrival of past storms (for example, prior to the arrival of a crest from the Neosho River on May 17 and 18, 2015). The conditions herein should address Miami's concerns.

stakeholders including the Corps, City of Miami, U.S. Fish and Wildlife Service, Oklahoma Water Resources Board, and Oklahoma Department of Wildlife Conservation one day prior to the weekly call or as is practicable before any predicted storm event; (6) GRDA should determine, in consultation with the Corps, whether to initiate pre-releases; (7) GRDA should notify all participants to the storm adaptive management process of any decision to initiate pre-releases; (8) if GRDA initiates pre-releases, it should use the existing operating guide, adjusted for the temporary variance, to lower the reservoir via generation and/or spillway gate releases taking into account upstream and downstream impacts; (9) GRDA should continue its in-place Emergency Action Plan protocol for notification of downstream residents during high flow events; and (10) within five (5) days of any conference call, GRDA should distribute, via email, reports containing meeting minutes from the conference call to all participants, and should file copies of the reports with the Commission, including any comments.

74. As we have noted, the licensee's proposed Drought Adaptive Management Plan for making downstream releases in the event of drought during the variance period is similar to the plan that was approved as part of the variance that was approved in 2012, under which the GRDA successfully operated the project during drought conditions. After reviewing the plan that was approved in 2012 and the licensee's current Drought Adaptive Management Plan, we believe GRDA's current plan lacks certain elements and that addition of the following elements is appropriate. First, the Drought Adaptive Management Plan should only be instituted if the water levels in Grand Lake fall below the elevations on the temporary rule curve as the result of a severe to exceptional regional drought. Drought conditions should be identified using the National Drought Mitigation Center's (NDMC) U.S. Drought Monitor.[51] The NDMC U.S. Drought Monitor provides short-term drought forecasts that are updated weekly, and it is the tool that was utilized in 2012 for monitoring current and expected short-term changes in drought conditions. When it is clear that such conditions are about to occur, the licensee should make decisions on hourly and daily release rates during the duration of the temporary variance utilizing input from relevant state and federal agencies and other appropriate entities. This input should be obtained, in part, by hosting weekly teleconferences with the Corps, U.S. Fish and Wildlife Service, Oklahoma Water Resources Board, Oklahoma Department of Wildlife Conservation, and the City of Miami, and Commission staff, throughout the period of the temporary variance. The licensee should ensure that during

[51] *See* http://droughtmonitor.unl.edu/. The NDMC is based in the School of Natural Resources at the University of Nebraska-Lincoln. The NDMC works in cooperation with the U.S. Department of Agriculture, National Weather Service, National Oceanic and Atmospheric Administration, U.S. Geological Survey, and other federal and state agencies.

implementation of the Drought Adaptive Management Plant, at each weekly teleconference the following issues are discussed: (1) current and forecasted drought conditions and planned project operation; (2) maintenance of water levels and flows sufficient to maintain downstream DO concentrations for water quality and the prevention of fish kills; (3) maintenance of reservoir elevations at Markham Ferry sufficient to operate the Salina Pumped Storage Project for system reliability; and (4) based on available information, when the temporary variance should expire and the licensee should begin targeting the rule curve again. Based on the success of this course of action during the 2012 drought, we conclude that approving the licensee's Drought Adaptive Management Plan, to include these elements, would provide a successful mechanism for responding to significant drought conditions if they occur during the temporary variance period, and it would help to protect fish and wildlife resources in the project area and also regional energy reliability.

75. In the event that the Drought Adaptive Management Plan is used, the licensee should record meeting minutes for each weekly teleconference and distribute a report containing copies of the minutes to all teleconference participants via email within five (5) days of each teleconference. The licensee should also file copies of the reports with the Commission. Copies of any written comments regarding the temporary variance received by the licensee should be included in the reports filed with the Commission. Termination of the use of the Drought Adaptive Management Plan should be determined by Commission order, based on the weekly teleconferences discussed above, and information that may be gathered from other sources.

76. Having considered GRDA's application for temporary variance, the comments submitted on GRDA's May 28 and July 30 applications, Commission staff's flood analysis, environmental analysis, and generation analysis, and GRDA's proposed storm adaptive management process, we find that the proposed variance would have multiple benefits and is not likely to significantly exacerbate flooding upstream or downstream of the project. Further, incremental increases to upstream and downstream flooding caused by the proposed variance could potentially be ameliorated through effective project operation, particularly pre-releases. Therefore, we approve GRDA's temporary variance subject to the conditions described in this order.

77. In addition, we note that our approval of GRDA's request for temporary variance in no way requires GRDA to deviate from the Article 401 reservoir elevation rule curve requirements for the project. Rather, we simply approve GRDA's request to deviate from the Article 401 reservoir elevation rule curve, which it does at its own risk. Regardless of

this temporary variance, section 10(c) of the Federal Power Act (FPA) provides that GRDA is liable for damages caused by its operation of the Pensacola Project.[52] Accordingly, should GRDA flood lands on which it has no flowage rights, it may be liable for any damages that result.[53]

78. We note that, since 1996, GRDA has repeatedly applied for either temporary variances from, or permanent changes to, the late summer/early fall reservoir elevations specified in the rule curve for the project. These prior applications were either withdrawn by GRDA, dismissed, or denied by the Commission, with the exception of this application and an application for a temporary variance that was approved in 2012 to alleviate drought. These applications have, on at least some occasions, been filed so close to the beginning of the proposed action that the Commission lacked sufficient time to examine the application and to provide for public notice and opportunity for comment before the requested action date. While we have obtained enough information in this instance to act on GRDA's application, in instances where there is a recurring issue at a project, the Commission generally disfavors piecemeal, temporary changes to license conditions, particularly on such an expedited basis. Accordingly, if GRDA believes that the current rule curve is not consistent with the public interest, it should apply for a permanent amendment of its license, after following the public consultation requirements of our regulations. Moreover, it should consult with Commission staff regarding the timing of any such application, so that it can be processed without undue time pressure on GRDA, the public, or the Commission.

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[52] *See* 16 U.S.C. § 803(c) (2012) ("Each licensee hereunder shall be liable for all damages occasioned to the property of others by the construction, maintenance, or operation of the project works or of the works appurtenant or accessory thereto, constructed under the license, and in no event shall the United States be liable therefore."); *also, e.g.*, *Pacific Gas & Electric Company*, 115 FERC ¶ 61,320, at P 21 (2006) (observing that while Congress intended for the Commission to ensure that hydroelectric projects were operated and maintained in a safe manner, Congress intended for section 10(c) of the FPA to preserve existing state laws governing the damage liability of licensees) (citing *South Carolina Public Service Authority v. FERC*, 850 F.2d 788, 795 (D.C. Cir. 1988)).

[53] For this reason, the City of Miami's assertions that we should deny the proposed variation because of its belief that GRDA lacks flowage easements for certain lands is misplaced. GRDA's right to flood property is constrained by the extent of its legal rights to do so. If GRDA exceeds its rights, it is subject to damages.

The Commission orders:

(A) Grand River Dam Authority's July 30, 2015 request for a temporary variance from the rule curve requirements under license Article 401 at the Pensacola Hydroelectric Project is approved, as modified by Ordering Paragraphs (B) through (D), below. The temporary variance expires October 31, 2015.

(B) *Storm Adaptive Management Process*: The licensee is required to use its storm adaptive management process during the temporary variance period. The licensee must work with the entities specified below to address concerns related to high water conditions upstream or downstream of Grand Lake O' the Cherokees (Grand Lake) prior to and during any precipitation event that occurs within the temporary variance period. The storm adaptive management process shall include the following: (1) within seven (7) days of the issuance date of this order, the licensee shall file with the Commission a list including contact name, phone number and email address, of all entities participating in the adaptive management process; (2) the licensee shall retain technical experts, with extensive knowledge of the meteorology of the area and the hydrology and hydraulics of the basin and dam, to participate in this process in order to answer questions and provide technical assessments of the current conditions and the impacts on the river basin and dam; (3) the licensee shall review, at minimum, on a daily basis weather forecasts in the watershed, Grand Lake surface elevation data, U.S. Geological Survey gages upstream and downstream of the project, surface elevations at the upstream and downstream reservoirs, and other relevant information affecting surface elevations at Grand Lake; (4) the licensee shall hold conference calls weekly, or more frequently as needed, to discuss the information in number (3) above and any other relevant information; (5) the licensee shall provide the information to federal and state resource agencies, local government officials, Commission staff, and interested stakeholders including the Corps, City of Miami, U.S. Fish and Wildlife Service, Oklahoma Water Resources Board, and Oklahoma Department of Wildlife Conservation one day prior to the weekly call or as is practicable before any predicted storm event; (6) the licensee shall determine, in consultation with the Corps, whether to initiate pre-releases; (7) the licensee shall notify all participants to the storm adaptive management process of any decision to initiate pre-releases; (8) if the licensee initiates pre-releases, it shall use the existing operating guide, adjusted for the temporary variance, to lower the reservoir via generation and/or spillway gate releases taking into account upstream and downstream impacts; (9) the licensee shall continue its in-place Emergency Action Plan protocol for notification of downstream residents during high flow events; and (10) within five (5) days of any conference call, the licensee shall distribute, via email, reports containing meeting minutes from the conference call to all participants, and shall file copies of the reports with the Commission, including any comments.

(C) *Drought Adaptive Management Plan*: The licensee shall institute its Drought Adaptive Management Plan if water levels in Grand Lake fall below the elevations on the temporary rule curve approved in this order as the result of a severe to exceptional regional drought as identified using information from the National Drought Mitigation Center's U.S. Drought Monitor. Once the Drought Adaptive Management Plan is instituted, the licensee shall make decisions on hourly and daily release rates during the duration of the temporary variance period utilizing input from the U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, Oklahoma Water Resources Board, Oklahoma Department of Wildlife Conservation, and the City of Miami, and Commission staff. This input shall be obtained, in part, by the licensee hosting weekly teleconferences with these entities throughout the period of the temporary variance. The licensee shall ensure that, during each weekly teleconference, the following issues are discussed: (1) current and forecasted drought conditions and planned project operation; (2) maintenance of water levels and flows sufficient to maintain downstream dissolved oxygen concentrations for water quality and the prevention of fish kills; (3) maintenance of reservoir elevations at the Markham Ferry Project sufficient to operate the Salina Pumped Storage Project; and (4) based on available information, when the Drought Adaptive Management Plan should expire and the licensee should begin targeting the rule curve again.

Within five (5) days of the weekly teleconferences, the licensee shall distribute, via email, reports containing meeting minutes from the teleconferences to all teleconference participants. The licensee shall also file copies of the reports with the Commission. Copies of any written comments regarding the Drought Adaptive Management Plan shall be included in the reports filed with the Commission. Cancellation of the Drought Adaptive Management Plan shall be determined by Commission order, based on the weekly teleconferences, and information that may be gathered from other sources.

(D) The Commission reserves the right to modify or cancel the Drought Adaptive Management Plan based upon information provided by the licensee, any state or federal agency, other entity, or upon its own determination.

(E) This order constitutes final agency action. Any party may file a request for rehearing of this order within 30 days from the date of its issuance, as provided in

§ 313(a) of the FPA, 16 U.S.C. § 825*l* (2012), and the Commission's regulations at 18 C.F.R. § 385.713 (2015).

By the Commission.

(S E A L)

Kimberly D. Bose,
Secretary.