ONTARIO POWER GENERATION

Public Information Report
GE1-REP-08410.1-06.18-0002
April 2019

Eugenia Falls Generating Station
Water Management Plan

Implementation Report

October 1, 2005 to December 31, 2018

Prepared by: Apr 25, 2019

Laci Farczádi — Date
Engineer - Water Management
Niagara Operations

Reviewed by: April 26/19.

Fernando Gonzalez — Date
Operating Manager
Niagara Operations

April 26, 2019 — Date
Kurt Kornelsen
Senior Manager
Water Resources

April 26, 2019 — Date
Heather Brown
Senior Manager
Environmental Operations Support

Approved by: Apr 26/2019.

Jessica Polak — Date
Vice-President Operations
Niagara Operations

Ministry of Natural Resources and Forestry

Owen Sound Field Office
1450 7th Ave East
Owen Sound, ON N4K 2Z1
Tel: 519-376-3860
Fax: 519-372-3305

Ministère des Richesses naturelles et des Forêts

Bureau du secteur d'Owen Sound
1450 ave 7 est
Owen Sound, ON N4K 2Z1
Tél: 519-376-3860
Téléc: 519-372-3305

Ontario

July 17, 2019

Laci Farczádi
Ontario Power Generation- Niagara Operations
14000 Niagara Parkway, RR#1
Niagara on the Lake, ON
L0S 1J0

Subject: Confirmation – Eugenia Falls Generating Station Water Management Plan Implementation Report Deemed Complete

Dear Laci Farczádi,

Thank you for submitting the required implementation report for the Eugenia Falls Generating Station Implementation Report to the Owen Sound MNRF office.

Upon review for completeness by the Ministry, the implementation report has been determined to be complete, in accordance with the requirements specified by the Ministry's Maintaining Water Management Plans Technical Bulletin, 2016.

The implementation report should now be posted for public viewing. Please inform us of when this has been completed and the location(s) where the Report is available.

If you have any questions please contact Zack O'Krafka, Zachary.O'Krafka@ontario.ca or 519-371-8466.

Sincerely,

Tracy Allison
Resource Management Supervisor
Owen Sound

Please call ahead to make an appointment with our staff.
The local Ministry office is open by appointment only.

Acronyms

CMP	Compliance Monitoring Plan
DICP	Data and Information Collection Program
EFWMP	Water Management Plan for the Eugenia Falls Generating Station
EMP	Effectiveness Monitoring Program
GSCA	Grey Sauble Conservation Authority
IR	Implementation Report
LEPOA	Lake Eugenia Property Owners Association
LER	Lake Eugenia Reservoir
MECPC	Ministry of Environment, Conservation and Parks
MNRF	Ministry of Natural Resources and Forestry
OPG	Ontario Power Generation
SAC	Standing Advisory Committee
WMP	Water Management Plan
WRC	Watershed Report Card
WSC	Water Survey Canada

Table of Contents

Acronyms 2
Table of Contents 3
1. Background 4
2. Summary of Amendment Requests 4
2.1. Description 4
2.2. Amendment Requests Received by OPG 4
2.3. Amendment Requests Proposed by OPG 4
2.4. Amendments Ordered by MNRF 4
2.5. Amendments Completed by MNRF 4
2.5.1. Administrative Amendment of March 31, 2015 5
2.5.2. Administrative Amendment of March 23, 2018 5
2.5.3. Administrative Amendment of June 29, 2018 5
3. Standing Advisory Committee 5
3.1. Description 5
3.2. SAC Status Update 5
4. Compliance Monitoring and Reporting Program 6
4.1. Description 6
4.2. Compliance Monitoring and Reporting Results 6
5. Effectiveness Monitoring Program 7
5.1. Description 7
5.2. Effectiveness Monitoring Program Components 7
5.3. Effectiveness Monitoring Program Results 7
5.3.1. Early Refill 8
5.3.2. Full Refill and Gradual Summer Decline 8
5.3.3. Longer Recreational Season 9
5.3.4. Accelerated Winter Drawdown Rate 9
5.3.5. Higher Winter Minimum Elevation 9
6. Data and Information Collection Program 10
6.1. Description 10
6.2. Data and Information Collection Program Components 10
6.2.1. Lake Eugenia Reservoir Inflows 10
6.2.2. Lake Eugenia and Surrounding Area Ecosystem 10
6.2.3. Lake Eugenia Reservoir Shoreline Damage by Ice 11
6.2.4. Lake Eugenia Minimum Outflow Requirement 11
7. Conclusions and Recommendations 12
8. References 13
9. Appendix A: List of Figures 14
9.1. Figure 1: Lake Eugenia Reservoir Water Level Statistics 15
9.2. Lake Eugenia Reservoir Inflow-Outflow Statistics 16

1. Background

The original Water Management Plan for the Eugenia Falls Generating Station (EFWMP) was prepared according to the Ontario Ministry of Natural Resources' 2002 *Water Management Planning Guidelines for Hydropower*, and approved for an initial ten year period from October 1, 2005 to September 30, 2015.

In June 2018, the EFWMP was amended to align with the Ontario Ministry of Natural Resources and Forestry's (MNRF) 2016 *Maintaining Water Management Plans* Technical Bulletin. This administrative amendment resulted in several changes, including a new Section 12 that mandates Ontario Power Generation (OPG) as the sole plan proponent, to submit an Implementation Report (IR) to the MNRF every five years.

IRs are required to provide status updates, transparency of dam operations, and inform adaptive management considerations, including the following minimum content:

- a summary of all amendment requests received,
- the status of the applicable Standing Advisory Committee (SAC),
- the results of the applicable Effectiveness Monitoring Program (EMP),
- the status and results of the applicable Data and Information Collection Program (DICP).

This document represents the first IR for the EFWMP covering the initial period from October 1, 2005 to December 31, 2018.

2. Summary of Amendment Requests

2.1. Description

This section of the report provides a summary of all amendment requests pertinent to the EFWMP, including the rationale for completed amendments and how proposed amendments that did not proceed were addressed, if applicable.

2.2. Amendment Requests Received by OPG

None.

2.3. Amendment Requests Proposed by OPG

None.

2.4. Amendments Ordered by MNRF

None.

2.5. Amendments Completed by MNRF

MNRF completed three administrative amendments to the EFWMP within the period of interest.

2.5.1. Administrative Amendment of March 31, 2015

MNRF approved and issued an amendment to the EFWMP to extend the term of the plan for an additional three years, to ensure that the plan remained in effect while a new Technical Bulletin was being prepared. The new expiry date for the EFWMP was set for March 31, 2018.

2.5.2. Administrative Amendment of March 23, 2018

MNRF approved and issued an amendment to the EFWMP to further extend the term of the plan for an additional six months, to allow for the completion of changes to the plan content in accordance with the 2016 Technical Bulletin. The new expiry date for the EFWMP was set for September 30, 2018.

2.5.3. Administrative Amendment of June 29, 2018

MNRF approved and issued an amendment to the EFWMP to align the plan with the approved 2016 *Maintaining Water Management Plans* Technical Bulletin.

The full text of the Technical Bulletin and additional information on the new requirements for the long-term maintenance of Water Management Plans (WMPs) are available on the MNRF website at:

https://www.ontario.ca/page/maintaining-water-management-plans?nocache=1.

This administrative amendment resulted in changes to the following sections of the EFWMP:

Expiry Date	has been removed
Monitoring and Reporting	Section 6 has been revised
Compliance	Sections 6 and 10 have been revised
Amendments	Section 11 has been replaced
Implementation Reports	Section 12 has been added

3. Standing Advisory Committee

3.1. Description

This section of the report discusses the status of the EFWMP SAC, the rationale behind the initial decision and the current recommendation on the subject.

3.2. SAC Status Update

The EFWMP does not have a SAC. The initial decision not to develop a SAC was based on the ‘simplified’ qualification of the EFWMP comprising one single waterpower facility (Eugenia Falls Generating Station) and one single plan proponent (OPG), the extensive history of consistent operation, and the lack of any major changes introduced by the plan in 2005.

Past and ongoing practices, featuring well established and effectively performing channels of communication between OPG and EFWMP stakeholders, provide support

for the argument for the present recommendation of no changes to the current SAC status (no SAC).

4. Compliance Monitoring and Reporting Program

4.1. Description

This section of the report provides a high-level summary on OPG's compliance with the operating, monitoring and reporting requirements prescribed in Sections 6 (*Operating Plan*) and 7 (*Compliance Monitoring Plan*) of the EFWMP. As such, it is intended to address the transparency on operations requirement of the IR, and to set the general operating context for the following EMP and DICP related content of this report.

4.2. Compliance Monitoring and Reporting Results

OPG has fulfilled all its compliance reporting requirements in a timely and complete manner, including incident notifications within 24 hour from occurrence, detailed written follow-up reports within 30 days from occurrence, and Annual Compliance Reports by January 31st for each calendar year.

Between October 1, 2005 and December 31, 2018, there were only three incidents of operation outside of the mandatory operating limits prescribed by the EFWMP. All three incidents were attributed to prevailing extreme inflow conditions, and concerned the Lake Eugenia Reservoir (LER) elevation according to the following details:

- August 3 to September 4, 2007 reservoir level fell and remained below the summer Lower Operating Limit (LOL)
- April 1-3, 2016 reservoir level rose above the Upper Operating Limit (UOL)
- September 2-4, 2016 reservoir level fell and remained below the summer LOL

where:

- UOL = 434.23 m mandatory year-round
- summer LOL = 433.86 m mandatory from May 24 to September 4
- fall-winter-spring LOL = 430.87 m mandatory from September 5 to May 23 (there were no incidents related to this parameter)

Specific details on prevailing hydrologic and operating conditions are available in the corresponding compliance reports submitted to MNRF.

Basic statistics on daily average water level and flow conditions vs. applicable operating requirements are illustrated in Figures 1 and 2 included in the Appendix.

5. Effectiveness Monitoring Program

5.1. Description

This section of the report provides a summary of the applicable EMP components outlined in the Section 8 of the EFWMP, including details on:

- background and intent of program components,
- timing and duration of monitoring conducted,
- findings and conclusions, e.g. assessment of impact,
- determination of whether revisions to the facility operations, or to the EMP, are required, e.g. proposed changes/amendments going forward.

5.2. Effectiveness Monitoring Program Components

The purpose of an EMP is to confirm that operational changes resulting from the implementation of a WMP generate the expected ecological, social and economic improvements.

Development of the EFWMP in 2005 served to formalize the manner in which the facility had been operated for many years, and introduced only a few and minor changes to the LER operating plan, for which it identified the following potential benefits versus detriments:

- improvements to waterfowl nesting conditions from earlier reservoir refill,
- improvements to wetland conditions from full refill and gradual summer decline,
- improvements to length of recreational season and quality of downstream fisheries from delayed and accelerated fall drawdown,
- improvements to lake fisheries from raised winter minimum operating limit,
- risk of early spring shoreline ice damage due to earlier refill,
- risk of exceedance of the upper operating limit due to full refill,
- risk of downstream flooding during winter frazil ice conditions due to compressed and accelerated drawdown.

Nevertheless, the EFWMP clearly acknowledged the lack of baseline data in all of the above noted areas of expected benefits and risks, and prescribed no specific EMP components beyond the generic attempts to:

- gather baseline data for use in the future,
- fill-in related and additional information gaps identified in Section 9 of the EFWMP.

5.3. Effectiveness Monitoring Program Results

By virtue of the Compliance Monitoring Plan (CMP) prescribed in Section 7 of the EFWMP, OPG is continuously gathering operating data relevant to the areas of potential improvements and risks identified in the EMP section. In constant consultation and partnership with MNRF and the Grey Sauble Conservation Authority (GSCA), and transparency towards all EFWMP stakeholders, OPG is also monitoring opportunities for gathering additional baseline data and information for potential future use. A brief

summary of the corresponding results is provided in the following subsections, along with references to additional sources of information on related environmental and social conditions.

The EMP components concerning the information gaps identified in Section 9 of the EFWMP are addressed in Section 6 of this report.

5.3.1. Early Refill

The EFWMP has advanced the spring target refill date by 35 days, from May 24 to April 19, as a best practice, rather than mandatory, requirement.

Based on daily average LER levels, this best practice requirement was met 87% of time.

OPG is not aware of any information sources/reports on impacts to waterfowl nesting conditions, nor of any ice damages to shoreline or property outside of the approved operating limits as a result of this best practice refill date.

5.3.2. Full Refill and Gradual Summer Decline

The EFWMP did not alter either of the UOL or summer LOL for the LER, nor did it prescribe any specific requirement on this subject beyond the general qualitative consideration laid out in Sections 5.2 (*Development of Options*) and 5.3 (*Methods and Criteria*).

Based on annual maximum daily average LER levels, the reservoir storage has been refilled on average up to 97% of full capacity. For comparison, the summer LOL mandates a minimum 87% refill each and every year. The UOL was exceeded on a single occasion during the late March – early April 2016 basin-wide flood event. This incident was attributed exclusively to the prevailing hydro-meteorological conditions, as a full refill of the LER is normally targeted for a late May timeframe.

A potential unintended impact associated with the full refill option, which has not been identified in the original EFWMP, recently came to OPG's attention. The impact is primarily related to the insufficiency of the municipal surface water drainage system in the vicinity of the LER Control Dam, and concerns aggravations caused by high groundwater levels potentially associated with close to full refill of the LER storage. OPG is working with the local municipality to better understand this issue in order to determine if operational changes are warranted.

The average seasonal decline computed, on a calendar year basis, as the difference between the maximum spring (from April 19 to May 23) and the minimum fall (from September 5 to October 14) daily average LER levels, was 0.29 m. For comparison, the difference between the applicable UOL and LOL is 0.37 m.

For information on impacts to regional wetland conditions refer to Section 6.2.2 of this report.

5.3.3. Longer Recreational Season

The EFWMP has extended the recreational season from 104 to 179 days (+72%) by prescribing the April 19 to May 23 spring and the September 5 to October 14 fall shoulder periods as subject to the summer LOL as a best practice, rather than mandatory, requirement.

Based on daily average LER levels, the full-season LOL requirement was met 92% of time. For the traditional May 24 to September 4 summer period, the average compliance rate was 97%, while for the notable fall extension of the recreational season, the same best practice requirement was possible to meet only 79% of the time. The vast majority of shortfalls were attributed to natural inflow conditions. Out of the 13 full-calendar years reported here, the compliance rate for the mandatory summer requirement was short of 100% only during the 2007 extremely dry and the 2016 very dry summer conditions, when reservoir levels and outflows where managed in close coordination with MNRF (additional details in subsection 6.2.4).

Average outflow during the October 15-31 approximate period of interest for downstream trout conditions was 2.73 m^3/s compared to the same period average inflow of 2.03 m^3/s. The incremental flow available from the reservoir drawdown was 0.70 m^3/s.

OPG is not aware of any relevant information sources/reports on impacts to downstream fisheries as a result of this extended recreational season and subsequently more stable downstream flows during the trout spawning period.

5.3.4. Accelerated Winter Drawdown Rate

Average outflow during the December 1 – February 28 winter period prone to frazil ice formation was 4.14 m^3/s compared to the same period average inflow of 3.43 m^3/s. The incremental flow due to the winter drawdown was 0.71 m^3/s.

OPG relies on its well established communication channels with MNRF and GSCA for notification on general watershed and specific frazil ice conditions, flood watches and warnings, and for coordinated mitigation or response actions when and as required.

OPG is not aware of any reports or analyses relevant to the incidence of frazil ice problems within the downstream zone of influence outlined in the EFWMP.

5.3.5. Higher Winter Minimum Elevation

The EFWMP raised the mandatory fall-winter-spring LOL for the LER by 1.37 m, from 429.50 to 430.87 m.

The past 13-year average minimum winter drawdown elevation is 431.99 m, while the absolute minimum daily average was 431.27 m, which is +0.40 m above the mandatory fall-winter-spring LOL.

For more discussion on impacts to lake fisheries refer to Section 6.2.2 of this report.

6. Data and Information Collection Program

6.1. Description

This section of the report provides a summary of the applicable DICP components outlined in Section 9 of the EFWMP, including details on:

- background and intent of program component,
- timing and duration of data or information collection conducted,
- findings and conclusions, e.g. assessment of information,
- determination of whether revisions to the facility operations or to the DICP are required, e.g. proposed changes/amendments going forward.

6.2. Data and Information Collection Program Components

Section 9 of the EFWMP lists a number of information gaps identified by the initial Steering Committee during the stakeholders' consultation process as points of interest or questions for future consideration. Filling these gaps was recommended to follow a cooperative approach between MNRF and OPG, including the ongoing close working relationship with the GSCA, and driven by practical needs subject to the availability of necessary resources, but without any official commitment on either side.

Given that no specific DICP was prescribed in the final EFWMP, nor conducted under its auspices since October 1, 2005, the following subsections provide a brief summary of relevant results from OPG's continuous collection of operating data, along with references to information on related environmental and social conditions.

6.2.1. Lake Eugenia Reservoir Inflows

The EFWMP has noted the lack of hard data on inflows entering the LER, and suggested the potential usefulness of such data for the management of the reservoir levels.

OPG's practice in this area has been and continues to be reliance on LER water balance calculations (as described in Section 7.1 of the EFWMP), complemented by continuous monitoring of upstream basin precipitation/snow cover quantities, downstream/nearby streamflow conditions as reported for the Beaver River near Vandeleur gauge site (Water Survey of Canada (WSC) station # 02FB013) and the estimated natural tributary inflow from the Boyne River watershed.

Overall operating performance and specific EFWMP compliance monitoring records provide supportive evidence for the adequacy of this practice and the current recommendation for no changes required.

6.2.2. Lake Eugenia and Surrounding Area Ecosystem

The status of the branching bur-reed, least bittern, horned grebe and black tern were recommended for investigation, along with up to date evaluations of LER's water quality, fisheries and local upstream wetlands.

While no information was found to be available on the shoreline vegetation specified in the EFWMP, relevant data is available on the LER's surface water quality and fisheries, as well as on regional forest and wetland conditions.

In conjunction with the Ministry of the Environment, Conservation and Parks (MECP), GSCA conducts a regular surface water quality monitoring program on LER. Water samples are collected eight times per year and analyzed for a number of key parameters (total phosphorus, total chloride, E. coli bacteria and total nitrates). Subsequent data is entered into the Provincial data base, posted on the GSCA's web site, and incorporated into the Watershed Report Cards (WRCs) issued every five years.

Consistent with the Conservation Ontario general watershed reporting guidelines, all three WRCs issued to date by the GSCA (2008, 2013 and 2018) also contain information on forest conditions (percentages of forest cover, forest interior and stream edge forestation), while the most recent (2018) report also includes additional information on wetland conditions.

Supplementary information on surface water quality (benthic invertebrate, total phosphorus and E. coli bacteria), water temperature and forest conditions (same three parameters as above) is available in the 2015 Beaver River Watershed Report commissioned by the GSCA.

Additional baseline information on LER fisheries is available in a 2015-2018 *Aquatic Habitat Study* commissioned by the independent Lake Eugenia Property Owners Association (LEPOA).

6.2.3. Lake Eugenia Reservoir Shoreline Damage by Ice

Normally, every winter the LER surface is covered by an ice cap that remains in place until the spring refill begins. Under longer than usual winter conditions, ice pieces of significant size/amount may remain in place until mid-April. The potential for ice damage along the reservoir shoreline in the spring has been identified in the EFWMP as a risk associated to the earlier refill target.

No formal reports of shoreline ice damage to private property outside of the approved operating limits for the LER have been received by OPG from the public.

6.2.4. Lake Eugenia Minimum Outflow Requirement

The EFWMP prescribed the historic minimum downstream flow of 0.93 m^3/s as a best practice, rather than mandatory requirement, noting the uncertainty around its suitability to sustain the aquatic ecosystem in the Beaver River during low flow conditions.

Based on daily average LER outflows, this best practice requirement was met 98% of the time. Most shortfalls (78%) occurred during the 2007 late summer to early fall period of extreme dry conditions experienced across the entire Beaver River watershed. The LER levels and outflows were managed in close coordination with MNRF, with outflows, although short of the best practice requirement, being maintained

consistently higher than inflows, at the expense of the reservoir level accepted to drop below the applicable LOL. Most other outflow shortfall incidents were caused by unforeseen generating station outage events, irregularly coincidental with low flow conditions, or of very short duration.

OPG is not aware of any available information regarding minimum flow impacts on downstream fisheries or aquatic ecosystem. Joint discussions with MNRF and GSCA representatives revealed that they were not aware of any specific issues raised in relation to downstream low flow conditions as related to the minimum outflow requirement for the LER.

Consequently, it is concluded that the current release practices seem to be adequate for the range of flow conditions experienced on the river, and no amendment to this EFWMP practice is required at this time.

7. Conclusions and Recommendations

The EFWMP is a simplified WMP with a single hydropower facility and plan proponent.

The plan came into effect on October 1, 2005, and since has been subject to three administrative amendments initiated and executed by MNRF. Currently there are no pending, envisaged, or recommended amendment requests for the EFWMP.

The EFWMP has no SAC, nor is one recommended as necessary at this time.

All compliance monitoring and reporting requirements have been fulfilled in timely and complete manner, and there are no outstanding issues or recommended changes to the CMP.

Similarly, neither of the EMP or DICP have any specific components beyond the generic recommendation to attempt to gather baseline data in areas of potential improvements and risks, and to fill-in associated or complementary information gaps. OPG's practice of continuously recording operational data (water levels and flows) as briefly summarized in this report, is of relevance for such baseline data considerations. No complementary data or information on environmental and social conditions have been gathered by OPG. Other sources of information from external agencies have been referenced where identified.

Overall, in review of the EFWMP and its governing objectives with regard to the identified environmental and social implications of operations at the Eugenia Falls Generating Station, no amendments to the EFWMP document are recommended at this time.

8. References

MNR, 2002. Water Management Planning Guidelines for Waterpower. Ontario Ministry of Natural Resources.

MNR and OPG, 2005. Water Management Plan for Hydropower for the Eugenia Falls Generating Station on the Beaver River for the ten year period October 1, 2005 to September 30, 2015. Ontario Ministry of Natural Resources, Midhurst District, Southern Region and Ontario Power Generation Evergreen Energy Inc.

GSCA, 2008. Watershed Report Card. Grey Sauble Conservation Authority.

GSCA, 2013. Watershed Report Card. Grey Sauble Conservation Authority.

GSCA, 2015. Beaver River Watershed Report. Prepared by Meghan Allerton for the Grey Sauble Conservation Authority.

MNRF, 2016. Technical Bulletin - Maintaining Water Management Plans. Ontario Ministry of Natural Resources and Forestry.

Biotactic, 2018. Seasonal Changes in Movement and Habitat Utilization of Bass in Lake Eugenia. Prepared for the Lake Eugenia Property Owners Association. Biotactic Fisheries Research and Monitoring.

GSCA, 2018. Watershed Report Card. Grey Sauble Conservation Authority.

MNRF and OPG, 2018. Water Management Plan for Hydropower for the Eugenia Falls Generating Station on the Beaver River. Ontario Ministry of Natural Resources and Forestry, Midhurst District, Southern Region and Ontario Power Generation Inc.

9. Appendix A: List of Figures

Figure 1: Lake Eugenia Reservoir Water Level Statistics

Figure 2: Lake Eugenia Reservoir Inflow-Outflow Statistics

Figure 1: Lake Eugenia Reservoir Water Level Statistics - 2006-2018

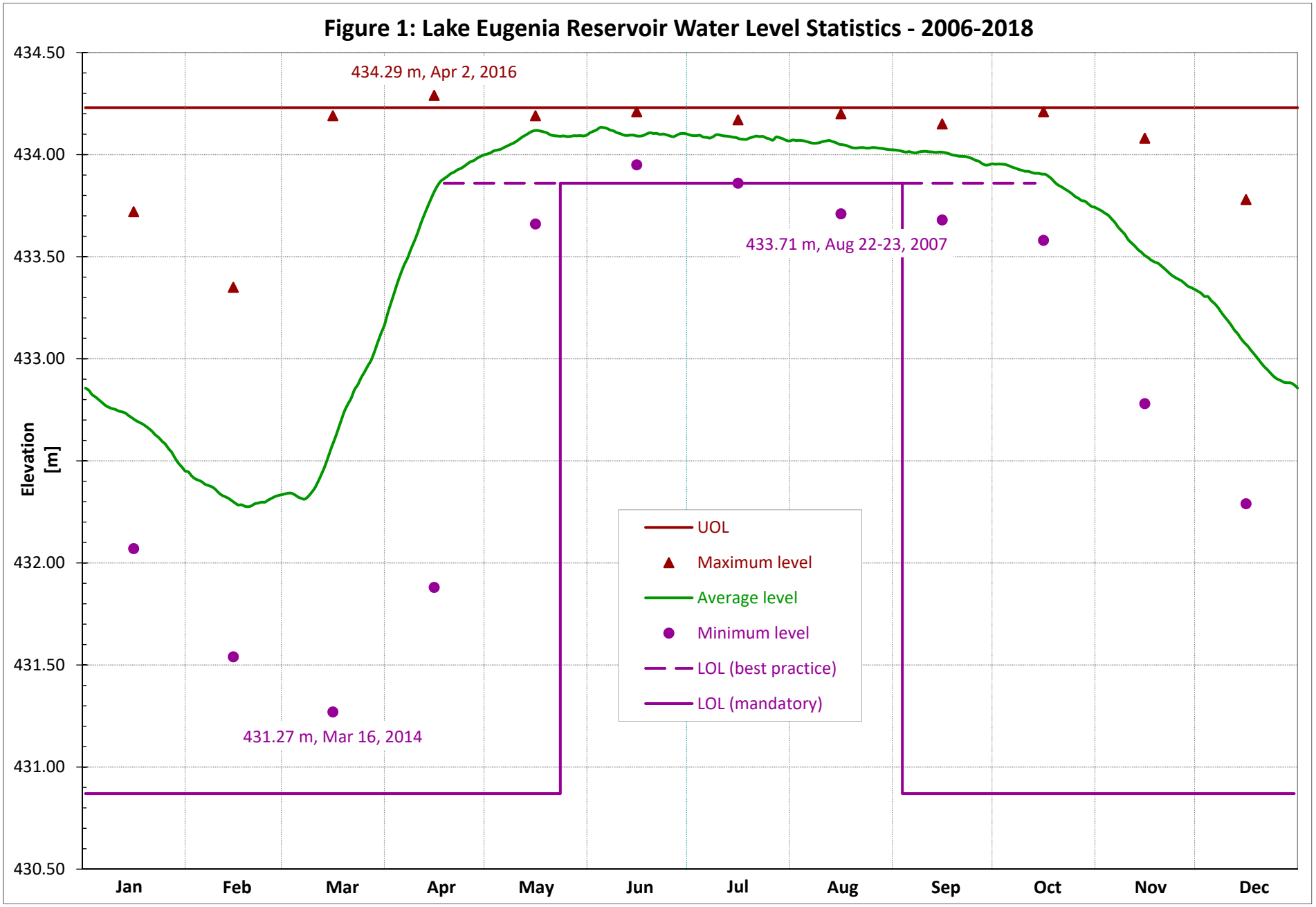

Figure 2: Lake Eugenia Reservoir Inflow-Outflow Statistics - 2006-2018