City of Marysville
Maintaining Ellis Lake

Summary

Ellis Lake is a "Jewel of Marysville" and ought to be treated as such (Figure 1). Methods to improve Lake Hydrology used in conjunction with a sequence of mitigation measures will provide an ecologically healthy environment for fish and waterfowl. This will put Ellis Lake on the must-see lists for visitors. To accomplish this goal, the city of Marysville is seeking the expertise to first analyze the complexities of the lake's hydrology, and then determine the best solutions to its problem. Alternative energy sources to provide power to the necessary pump systems are needed to accomplish the ideal environmental conditions that will bring the "Jewel of Marysville" to the lustrous shine it deserves.

Figure 1. *Ellis Lake.*

Introduction and background:

History: From a distance, Ellis Lake is a beautiful centerpiece of the City of Marysville. Since the 1930's, this man-made lake is surrounded by lush greenery, and sidewalks with flocks of ducks, geese, and a variety of other birds; both transient, and migratory. It is bounded by 9th Street to the South, B Street to the East, and 300 yards beyond the14th Street Bridge to the North, and D Street to the West. (Figure 2)

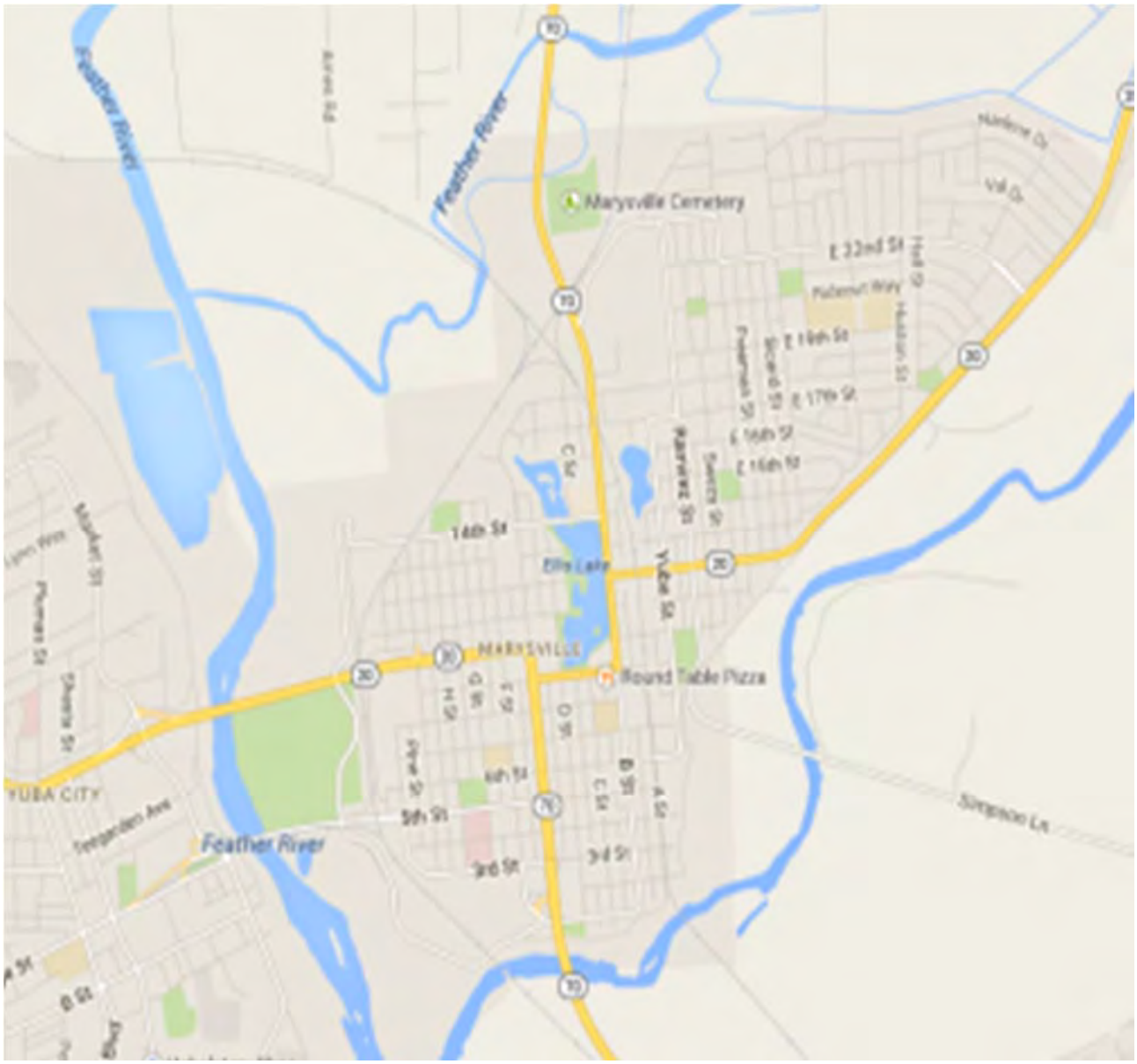

Figure 2. *This map shows Ellis Lake and the confluence of the Yuba and Feather Rivers.*

Ellis Lake was once an unsightly spillway of the Feather River. It wasn't until 1924 that the Women's Improvement Club of Marysville commissioned Robbie McLaren, famed designer of the Golden Gate Park in San Francisco, to turn the swamp into a beautiful lake. The project was completed in 1939. The lake, named for Marysville citizen W.T. Ellis, Jr., offers a pleasant walk, picnic areas, and fishing.

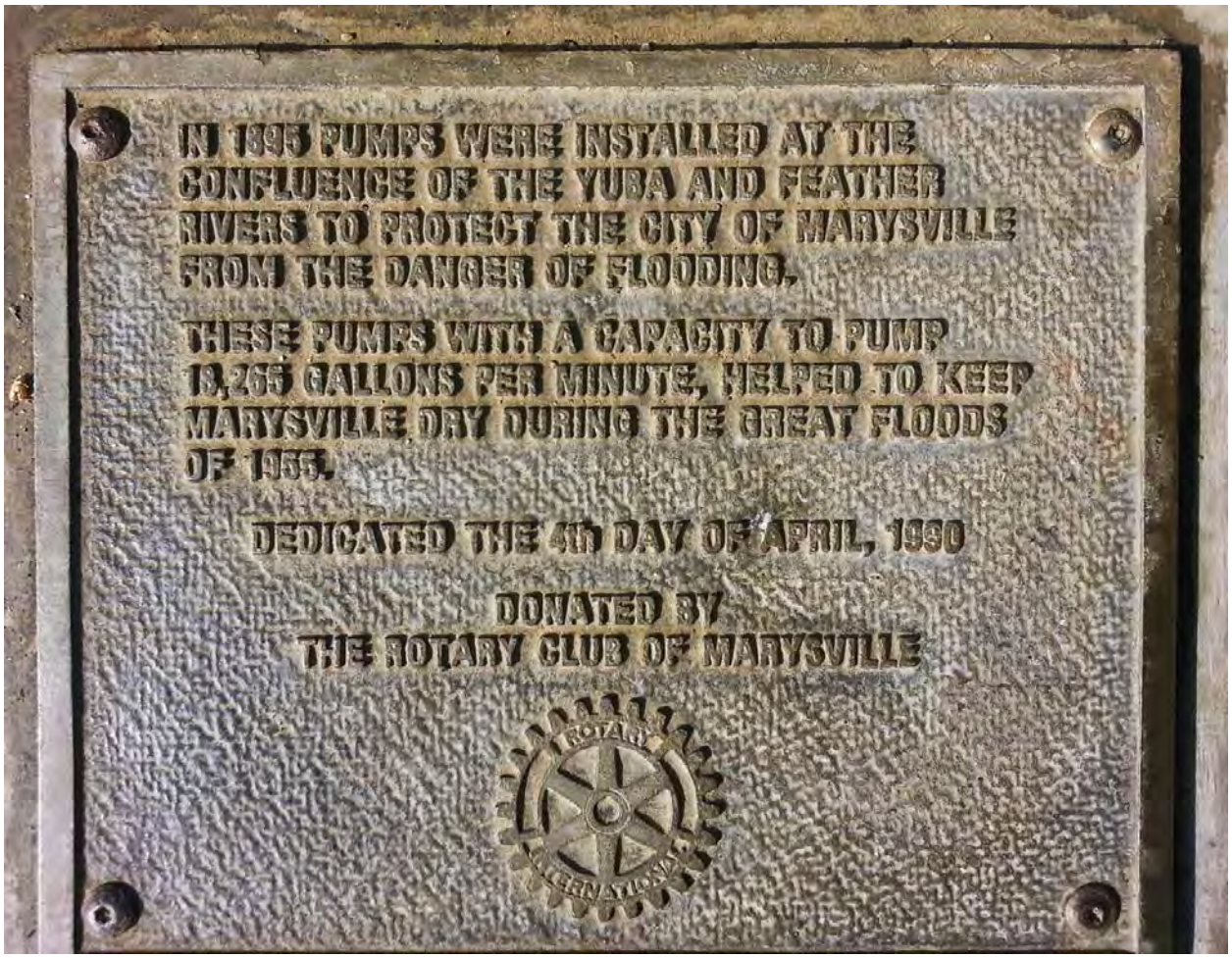

Figure 3. *This plaque is mounted next to an original pump donated by the Rotary Club of Marysville on April 4, 1990.*

The following is inscribed on a plaque next to an original pump that is mounted on park grounds near the southwest side of the lake. (Figure 3) This pump was donated by the Rotary Club of Marysville on April 4, 1990. (Figure 2) *"In 1895 Pumps were installed at the confluence of the Yuba, and Feather Rivers, (Figure 1) to protect the city of Marysville from the danger of flooding. These pumps, with a capacity to pump 18,265 gallons per minute, helped to keep Marysville dry during the great floods of 1955."* (Figure 5)

Figure 4. *In 1895 Pumps were installed at the confluence of the Yuba, and Feather Rivers, to protect the city of Marysville from the danger of flooding and were powered by high capacity electric motors.*

The following is an excerpt from W.T. Willis' journal titled, Memories: My Seventy-Two Years in the Romantic County of Yuba: …*"It was in December, 1849 that Stephen J. Field arrived at San Francisco, and after a short attempt to practice as an attorney, decided to establish himself in the newly laid town of Vernon (at the mouth of the Feather River); but when he arrived at the site of Vernon, flood waters covered almost the entire territory, so he decided to move the town of Marysville (at the time called 'Jubaville' which previously had been called Nye's Ranch), the town-site having just been laid out"…*

Figure 5. *These pumps have a capacity to pump 18,265 gallons per minute. That's approximately equal to the capacity of the average back yard swimming pool, each minute.*

Work on the lake was completed by unemployed local men during the Great Depression through President Franklin Roosevelt's New Deal Plan. Original work included landscaping, construction of two tennis courts, a judging stand, and a 20-foot concrete and native stone bridge connecting the mainland with an island in the lake, a dock and boat landing, 39 rubble rock electroliers for night illumination; and the installation of an ornamental fountain and rubble walls on the banks.

Figure 6. *Above is an example of a proposed "Floating Island" 10 of which are to be built, and installed over time in Ellis Lake, pending approval by the Marysville City Council, and the Marysville Public Works Department.*

More recently, there were boat races, and paddle boat rentals were common on the lake in the early 2000's until the middle of 2008, fishing derbies were also among the varied activities conducted on Ellis Lake.

Methodology and Approach:

Documents: The Grand Jury consulted a number of documents during the course of the investigation. The most relevant are listed in the Bibliography section at the end of this report.

Site visits: The Grand Jury visited Ellis Lake on two occasions in August 2013 and April 2014.

Interviews: The Grand Jury Interviewed the City of Marysville, Director of Public Works twice:

- First interview: August 2013
- Second interview: April 2014

Discussion and Narrative:

Marysville Municipal Codes, implemented in 2008, explain and define the use of Ellis Lake:

Marysville Municipal Code § 6.20, It is illegal to swim in, wade in, waterski on, have any form of body contact with the water of, or place or operate a motorboat in Ellis Lake without special written permission from the Marysville City Council. This is because the water is polluted. Punishment is a fine for the first offense, and a $150 fine for each subsequent offense.

Marysville Municipal Code § 16.30, fishing in Ellis Lake is permitted with a valid fishing license. Punishment for fishing without a license is a $150 fine.

Marysville Municipal Code § 16.40, it is illegal to use, or sell fireworks in Ellis Lake Park without a permit from the director of public works, or the fire chief. Punishment is a fine of up to $250.

Marysville Municipal Code § 16.20, it is illegal to possess or consume any alcoholic beverage in Ellis Lake Park without a permit. Punishment is a $250 fine.

Marysville Municipal Code §16.04, it is illegal to be in any park or recreation area in Marysville except Beckwourth Riverfront Park Complex at any time between the hours of 11:00 p.m. and 6:00 a.m. It is also illegal to play “hazardous games”-including horseshoe tossing, archery, and flying motorized model airplanes-in any park or recreation area in Marysville. Punishment for either of these offenses is a $250 fine. (See reference 5 for Marysville Municipal Codes)

It is illegal to be in any park or recreation area in Marysville except Beckwourth Riverfront Park Complex at any time between the hours of 11:00 p.m. and 6:00 a.m. It is also illegal to play “hazardous games,” including horseshoe tossing, archery, and flying motorized model airplanes in any park or recreation area in Marysville. Punishment for either of these offenses is a $250 fine.

Feeding of the ducks, geese, and other waterfowl is discouraged for at least two reasons. First, a diet of peanuts, popcorn, bird seed, etc. are not the kinds of diets that are conducive to long term good health for these animals. Second, feeding them encourages staying in the area instead of migrating. This in turn weakens the birds' resistance to disease. In the past, there have been sick birds whose conditions have been compounded by lack of seasonal healthy migratory behavior.

Currently, the lake waterfowl appear to be healthy, and not overpopulated.

Funding Sources: The Marysville Public Works Department (MPWD) is responsible for the maintenance of Ellis Lake, and all park facilities associated with the lake. The MPWD's annual budget allocation comes from the City of Marysville's general fund was approximately $273,000. The 2012/2013 budget allotment was approximately $284,000. Currently, the 2013/2014 budget is projected to be $338,000, but for the first time, includes funds for maintenance of the baseball stadium. Formerly, the allocation for the baseball stadium was separate.

Lake Hydrology: Ellis Lake is 5 to 7 feet deep. With such a shallow depth, heat absorption is rapid, making conditions right for what biologists call eutrophication, or more precisely hypertrophication. Hypertrophication is the ecosystem's response to the addition of artificial or natural nutrients that become highly concentrated when there is a lack of drainage (see reference 3). The cycle of bacterial growth evolves to contribute to the foul odors when conditions are right. Those nutrients are being recycled year after year, feeding microorganisms in the lake. The above described conditions involving eutrophication currently are not evident, although similar conditions have existed in the past in Ellis Lake. Recently, samples of water were taken, and analyzed for contents, which showed extremely low levels of phosphorus, and ammonia. This is surprising, because samples taken in 2012 indicated high levels of these two nutrients.

Bacterial Levels: Another somewhat more serious condition arises when concentrated bacterial toxins reach levels that are considered a threat, primarily to waterfowl, in the form of botulism toxin. (See reference 4)

When the botulism toxin producing conditions become evident, public works personnel will treat the lake with a mixture of phosphorus and ammonia that reduces the bacterial load in the lake to safer levels. Each of the treatments costs the MPWD $2,000-$3,000; ironically, the treatments used to reduce botulism toxin, ultimately can make the problem (or problems) worse.

The only way water leaves the lake under the control of the MPWD is over a weir. A weir is a low dam that is built across a river, dam, or lake to raise water level, divert water, or control its flow. In the case of Ellis Lake, the weir allows the lake level to be lowered by a small percentage of its maximum height. Therefore, for all practical purposes, the only way water leaves the lake is by overflow, over the weir, or by evaporation. That evaporation concentrates the pollutants, minerals, and fertilizers, which in turn, promotes elevated algal and bacterial growth. There is no aeration system in the lake that would mitigate growth of anaerobic bacteria and alleviate the stagnant conditions. The lake has a fountain that is mostly aesthetic. However, running it does

help with lake circulation and aeration, albeit at only about 5% of the efficiency of a dedicated aeration system.

Another consequence of the shallow depth of Ellis Lake is that water evaporates so rapidly that it becomes necessary to pump water into it to raise the level. The Yuba County Water Agency (YCWA) provides water to 7 local water districts; one of which is the California Water Service Company (CWSC). The filling of the lake is accomplished by the use of a high capacity pump that was donated to the city by the CWSC. The CWSC has offered the city another pump to supplement the current pump, or to replace it. City representatives did not accept the pump, because there was no source of funding for the maintenance and operational costs associated with the pump. The cost of filling Ellis Lake is approximately $11,000 annually.

Yuba County currently has solar panels over the parking lot at its administration building in Marysville. Plans for a second array at Yuba County Airport are in the final stages of approval. There are also plans to place solar arrays on all county buildings in the future. Similar arrays could be a source of energy savings for the City of Marysville. A system called net metering, which connects a customer's alternative power-generating system to a public utility's power grid can offset the cost of power drawn by the customer from the grid. One can use net metering for wind turbines, and solar panels and sell energy back to the grid. The City of Marysville could reduce the annual $11,000 cost of filling Ellis Lake by the installation of solar panels.

Green Hydro-technology to Improve Lake Quality: A group called Ellis Lake Restoration Project (ELRP) has developed a plan for solutions to most of the adverse conditions plaguing the lake. Their plan has several options for phased deployment over time. Recently, ELRP submitted a plan to the city that would demonstrate the practicality, and effectiveness of their *floating island* idea. The plan is designed as a long-term solution; therefore, changes in the condition of the lake will not be apparent with the installation of just one floating island. The city has agreed to the installation of one prototype experimental island to be placed in the lake in the near future.

Quoting from the group's Facebook webpage:

"Our idea being brought forward is to construct 8' diameter floating islands of the one thing Ellis Lake is missing in its little ecosystem…PLANTS!... …The plant roots will grow through the island, and live in the water. The plan begins with one island". …"The goal is to have 10 interconnected islands circled around the center of the lake with an upgraded aerating fountain in the center of the islands."

The Ellis Lake Restoration Project has been around for many years. The company that is offering a solution to Ellis Lake water conditions has a website (See reference 6) and Ellis Lake Restoration Projects has a Facebook Page (See reference 7). In 2008, ELRP was able to raise enough attention to the deteriorating conditions of the lake that the city and county took steps to make improvements that were rudimentary and temporary

remedies at best. In 2008, Ellis Lake received a makeover after a history of major problems, described in the Yuba College Prospector (See reference 8). Currently, ELRP has a prototype floating island almost ready to deploy into the lake. This prototype was paid for with donations from many citizens, and supporters of ELRP. The company that will be making these islands has an extensive long term plan to place these islands in the lake over a period of time, with the ultimate goal being to clean the lake, and create a habitat for fish and waterfowl to flourish.

The City of Marysville will not allow further deployment of the islands until an expert can analyze the lake issues, and advise the city of its best options for remedy.

Findings

The Yuba County Grand Jury finds that:

F1. The funds allocated towards lake care are inconsistent, and inadequate for providing basic upkeep of the lake, and the surrounding park facilities.

F2. Water enters Ellis Lake by pumping or by rainfall, and leaves the lake by evaporation or by spilling over a weir. Pollutants accumulate, because of limited flushing of the lake.

F3. The periodic unpleasant appearance and odors of the lake are caused by biological processes that are exacerbated by the accumulated pollutants in the lake.

F4. Solar panels installed at various locations by the City of Marysville might supply power economically for Ellis Lake pumps through net metering.

F5. ELRP has developed a plan for alleviating many of the adverse conditions plaguing the lake, and has received city permission to deploy one experimental floating island in the lake.

Recommendations

The Yuba County Grand Jury recommends that:

R1. The Marysville Public Works Department be provided more funding for the maintenance of the lake.

R2. The concentration of pollutants be mitigated by flushing the lake, by increased pumping, and by using the second pump offered by the California Water Service Company.

R3. The lake be aerated by increased operation of the fountain, until an aeration system can be installed.

R4. The Marysville Public Works Department consider constructing a solar panel array and apply net metering to offset the cost of power used to operate the pumps at Ellis Lake.

R5. The floating island project be implemented, until a better solution is found that addresses the problems of the lake.

Commendation:

C1. The Yuba County Grand Jury commends the Marysville Public Works Department for doing the best it can to maintain the lake with limited funds.

Request for Responses:

Pursuant to Penal Code section 933.05, the Grand Jury requests responses as follows:

- Marysville Public Works Department
- Marysville City Council
- Mayor of Marysville
- Yuba County Water Agency

The governing bodies indicated above should be aware that the comment or response of the governing body must be conducted in accordance with Penal Code 933(c) and subject to the notice, agenda and open meeting requirements of the Brown Act.

Bibliography: Internet Resource Links

1. Memories; My Seventy-two Years in the Romantic County of Yuba, by W.T. Ellis; with an introduction by Richard Belcher: n. d. (No Date) retrieved May 2, 2014 from: http://lcweb2.loc.gov/cgi-bin/query/r?ammem/calbk:@field(DOCID+@lit(calbk136div6)):

2. Wikipedia, Ellis Lake n. d. retrieved May 2, 2014 from: http://en.wikipedia.org/wiki/Ellis_Lake

3. Wikipedia, Eutrophication n. d. retrieved May 2, 2014 from: http://en.wikipedia.org/wiki/Eutrophication

4. Wikipedia, Botulism. n. d. retrieved http://en.wikipedia.org/wiki/Botulism.

5. Marysville Municipal Code, Parks and Recreation areas: n. d. retrieved May 2, 2014 from: http://www.codepublishing.com/CA/marysville/html/MarysvilleCA16/MarysvilleCA16.html

6. The company that is offering a solution to Ellis Lake water conditions has a website here: n. d. retrieved May 2, 2014 from: http://www.floatingislandswest.com/

7. Ellis Lake Restoration Project's Facebook page is here: n. d. retrieved May 2, 2014 from: https://www.facebook.com/helpellislakeprosper

8. In 2008, Ellis Lake received a makeover from a then recent history of major problems, described in the Yuba College Prospector here: April 29, 2008, retrieved May 2, 2014 from: http://www.theprospector.org/2008/04/the-ruin-and-recovery-of-ellis-lake/


YUBA COUNTY
CALIFORNIA