

Is Lake Merritt worth 198 million dollars?

**What do the dissolved oxygen levels tell us
about the water quality of Lake Merritt?**

Analysis of the Lake Middle area of Lake Merritt

By Mayra
Lighthouse Community Charter School
January 2003



Table of Contents

Purpose:

Why did we study the dissolved oxygen levels at Lake Merritt?

Background:

What is the natural and human history of Lake Merritt?

Methods and Procedures:

What did we do? How did we collect dissolved oxygen data?

Data:

What was the data we collected and what did it show?

Conclusions and Recommendations:

Does Lake Merritt's water quality need to be improved?

Photo Gallery:

Pictures that capture what we did.

Acknowledgements:

Who do we need to thank for helping us?

Purpose:

Why did we study dissolved oxygen at Lake Merritt?

By: Mayra

Dissolved oxygen is really important for healthy water. Healthy water let's the creatures live underwater. For aquatic life to live, the dissolved oxygen needs to be 6-18 parts per million (ppm). That means the water needs to be very clean. The 6th grade students right away we got interested and worried. That's why we go to Lake Merritt every Thursday to test the dissolved oxygen. We go to see if it is possible for aquatic life to live.

On November 5 there was a bond measure called Bond Measure DD. This bond measure is a vote for \$198,000,000 to Lake Merritt. If passed, the city of Oakland will have to pay taxes to raise the \$198,000,000. We studied Lake Merritt to see if it was worth 198,000,000. Do you think Lake Merritt is worth 198,000,000?

Background

by: Mayra

The land of California buckles and rises. The Oakland hills form. Rain shapes the land. Creeks carve the channels and carry water down from the hills to the mudflats and marshes the area of "Lake Merritt".
Date: million years ago



Grizzly bears, elk, deer, ducks and moose share the ecosystem of "Lake Merritt" with the Native Americans.
Date: a few hundred years ago



Don Luis Peralta took ownership of the land near "Lake Merritt" and named the marsh, Lake Peralta.
Date: 1846's



Sam Merritt became Mayor of Oakland. He built a dam and created "Lake Merritt".
Date: 1869



Children's Fairland is open.
Date: 1950



Sewer pipes going into Lake Merritt were connected to the wastewater treatment plants. Finally!
Date: 1980



The Lake Merritt Institute formed and Dr. Bailey became the lake keeper.
Date: 1992

The History of Lake Merritt

By: Mayra

Facts about Lake Merritt

- Lake Merritt is 8-10 feet deep
- Lake Merritt is 3 miles around
- There are 60 storm drains and 1 filter
- There are algae in Lake Merritt
- Lake Merritt's water is fresh and salty
- You can swim in Lake Merritt in the summer

Methods or Procedures

What did we do? How did we study the Lake and collect dissolved oxygen data?

By: Mayra

On September 11,2002 everyone went to Lake Merritt in advisories. Everyone had a section of the Lake, and also had a job assigned. We had to study water quality, aesthetics, and recreational opportunities. We had to interview people around the Lake and asked them if Lake Merritt was worth \$198,000,000. Most people did think Lake Merritt was worth \$198,000,000.

On September 18,2002 we met Dr. Bailey the Lake keeper, and pretended to be Sam Merritt, the mayor of Oakland 133 years ago. Then he showed us a movie about sewers and storm drains, and about the Lake.

On September23,2002 Kristin Hathaway came to teach the 6th graders how to use dissolved oxygen kits. Everyone was in different groups. Then we had instructions from Kristin Hathaway to learn how to test dissolved oxygen.

On October2,2002 Everyone went walking to the Sailboat House and then we went on boats. Dr. Bailey, Jonas , and James took us on boats. Then we

tested the D.O. of different parts of the Lake. Then we had a boat race. It was fun.

We collect the dissolved oxygen every Thursday. We studied the lake for 9 weeks.

We had four testing jobs at the Lake. Testing and Equipment coordinator is the person who is in charge of carrying the dissolved oxygen kits. Water Sampler is the person who rinses the bottle and collects the water sample without getting bubbles inside the bottle. Water Fixer is the person who fixes the water sample. Tritrator is the person who titrates the sample, and reads the titrator to see what is the D.O.

Every Wednesday one advisory goes and cleans the Lake. It is very important to clean the Lake, because there's a lot of garbage and that affects the D.O.

Dissolved Oxygen Testing Steps:

The water sampler—collects the water!

1. Rinse the sampling bottle and replace cap.
2. Submerge bottle. Remove cap.
3. Tap sides of bottle to release air bubbles.
4. While bottle is submerged, replace cap and retrieve from water.

The sample fixer—fixes the oxygen in the water:

1. Add 8 drops of **Manganous Sulfate** solution (pink bottle).
2. Add 8 drops of **Alkaline Potassium Iodide Azide** (yellow bottle). Cap and mix. Allow precipitate to settle.
3. Use spoon to add 1 gram of **Sulfamic Acid Powder**.
4. Cap and mix until reagent and precipitate dissolve. Sample is now “fixed” which means the oxygen can now be measured.

The titrator---measures the dissolved oxygen in parts per million

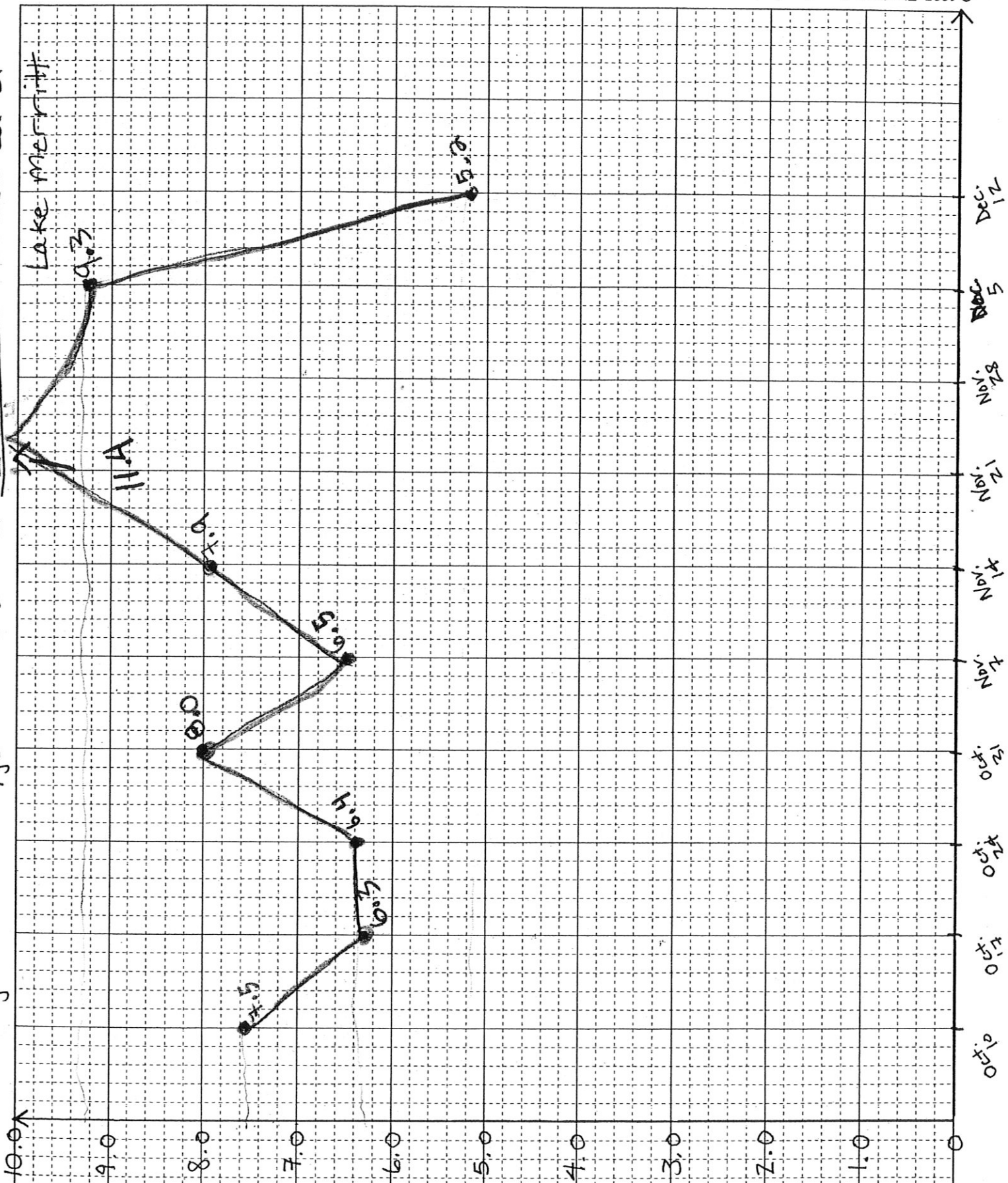
1. Fill titration tube to 20 mL line with “fixed” sample. Cap.
2. Fill titrator with **Sodium Thiosulfate**. Add one drop at a time to sample. Swirl between each addition until color is a very fair yellow.
3. Remove titrator and cap. Add 8 drops of **Starch Indicator Solution**. Replace cap and titrator.
4. Titrate sample until blue color disappears.
5. Read titrator scale for D.O. in ppm.

Lake Middle

Dissolved Oxygen			
Date	AM	PM	Avg.
10-Oct	5.5	9.5	7.5
17-Oct	4.4	8.1	6.2
24-Oct	9.8	3.0	6.4
31-Oct	10.0	6.0	8.0
7-Nov	5.6		5.6
14-Nov	10.0	5.7	7.9
21-Nov		11.4	11.4
5-Dec	10.0	8.5	9.3
12-Dec	5.8	4.6	5.2

By: Mayra

Dissolved Oxygen in parts per million (ppm)

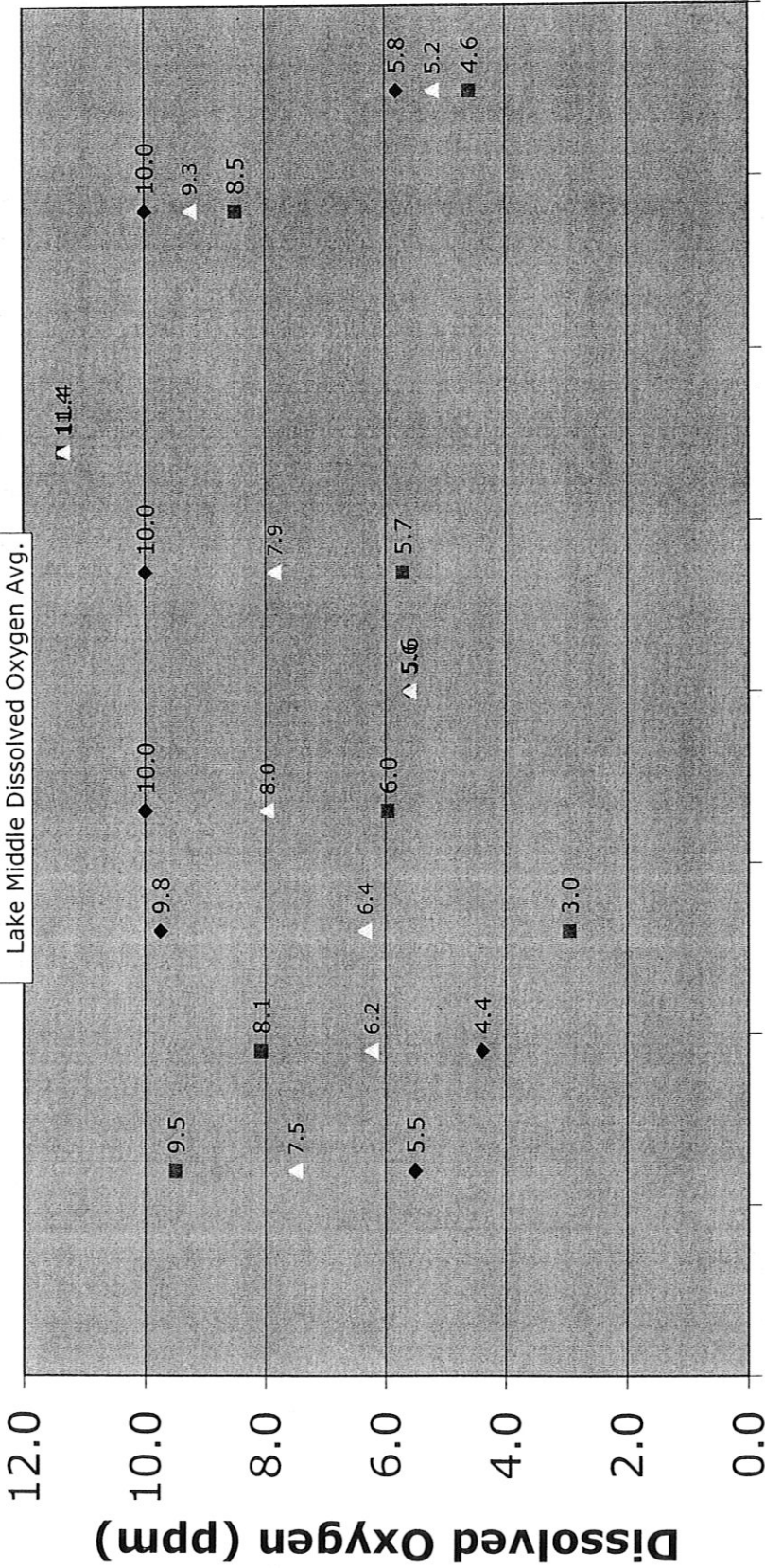


Lake Merritt

11A

Lake Middle Dissolved Oxygen Levels - by Mable, Angelica and Mayra

◆ Lake Middle Dissolved Oxygen AM
 ■ Lake Middle Dissolved Oxygen PM
 ▲ Lake Middle Dissolved Oxygen Avg.



28-Sep 8-Oct 18-Oct 28-Oct 7-Nov 17-Nov 27-Nov 7-Dec 17-Dec

Date

Dissolved Oxygen Levels taken at the Surface of Lake Merritt

(the D.O. level is the average of A.M. and P.M. tests)

Trestle Glen	D.O. (ppm)
10-Oct	3.8
17-Oct	4
24-Oct	5.1
31-Oct	5.1
7-Nov	4.3

Bird Refuge	D.O. (ppm)
10-Oct	2
17-Oct	3.5
24-Oct	2.9
31-Oct	5.9
7-Nov	2.8
14-Nov	5.8
21-Nov	9.2
5-Dec	5.9
12-Dec	4.4

18th Street	D.O. (ppm)
10-Oct	8.5
17-Oct	4.1
24-Oct	3.7
31-Oct	4.9
7-Nov	3.9
14-Nov	3.9
21-Nov	7.7
5-Dec	4.9
12-Dec	6.6

Lake Middle	D.O. (ppm)
10-Oct	7.5
17-Oct	6.3
24-Oct	6.4
31-Oct	8
7-Nov	5.6
14-Nov	7.9
21-Nov	11.4
5-Dec	9.3
12-Dec	5.2

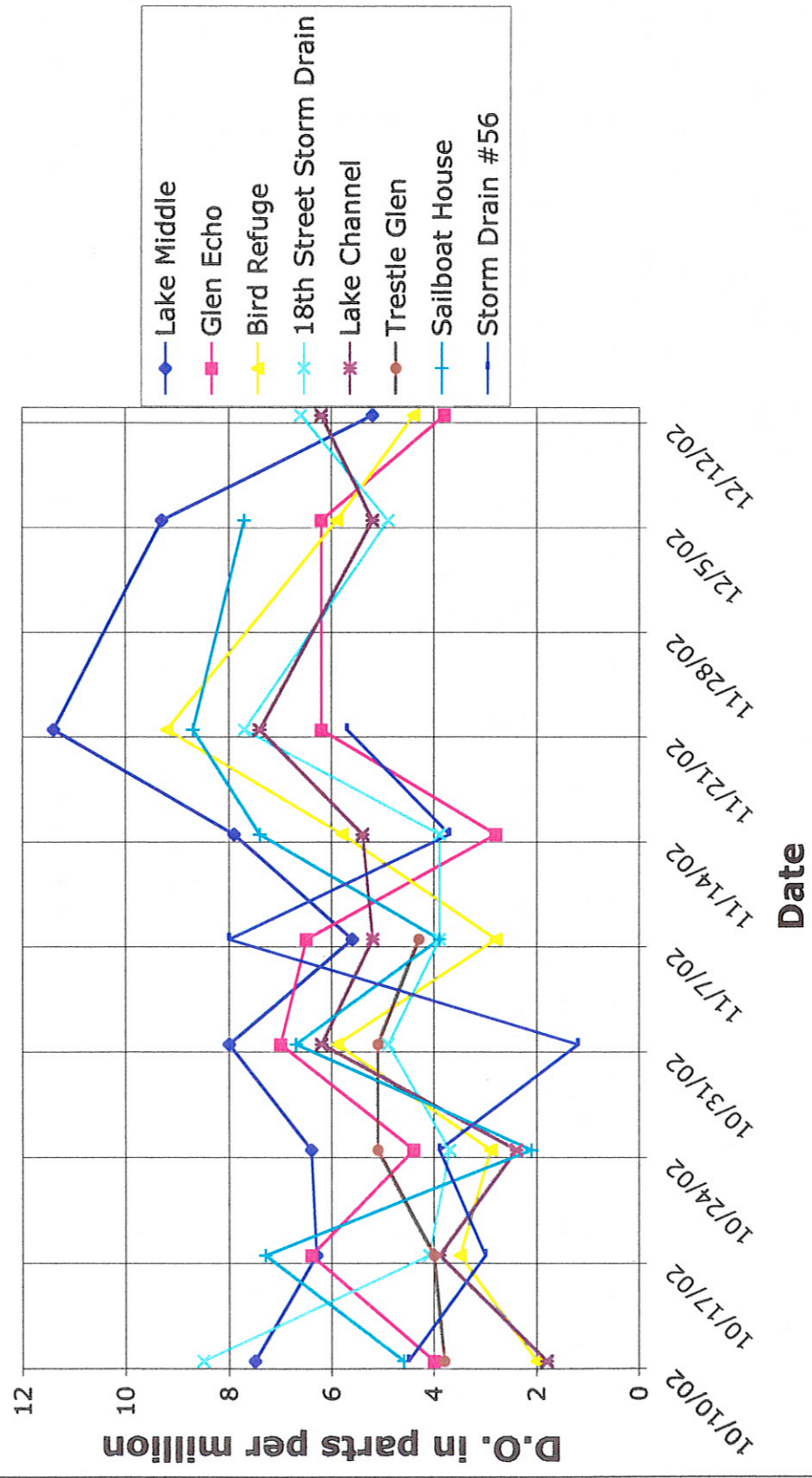
Lake Channel	D.O. (ppm)
10-Oct	1.8
17-Oct	3.9
24-Oct	2.4
31-Oct	6.2
7-Nov	5.2
14-Nov	5.4
21-Nov	7.4
5-Dec	5.2
12-Dec	6.2

Glen Echo	D.O. (ppm)
10-Oct	4
17-Oct	6.4
24-Oct	4.4
31-Oct	7
7-Nov	6.5
14-Nov	2.8
21-Nov	6.2
5-Dec	6.2
12-Dec	3.8

Sailboat House	D.O. (ppm)
10-Oct	4.6
17-Oct	7.3
24-Oct	2.1
31-Oct	6.7
7-Nov	3.9
14-Nov	7.4
21-Nov	8.7
5-Dec	7.7

Storm Drain #56	D.O. (ppm)
10-Oct	4.5
17-Oct	3
24-Oct	3.9
31-Oct	1.2
7-Nov	8
14-Nov	3.7
21-Nov	5.7
12-Dec	7.3
19-Dec	8

Dissolved Oxygen Levels at Lake Merritt



This is a graph that shows all of the Lake Merritt data.

Data and Analysis

What was the data we collected and what did it show?

By: Mayra

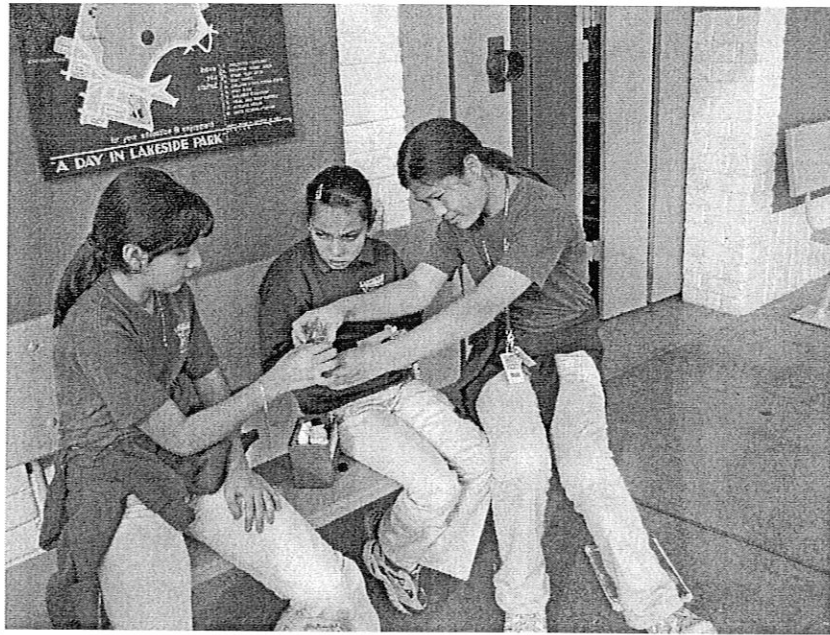
The D.O. at the Lake Middle area of the lake fluctuated between 5.2 and 11.4 ppm. The data from Lake Middle part of the lake shows a pattern over the 9 weeks. The D.O. fluctuates. Means to change to over time. It slightly increases.

There are many reasons that cause D.O. to fluctuate. Rain, wind, waves, current or fountains. Algae increases during the day. Cold temperature increases the D.O. level. Fast moving water (Tides) increases D.O. levels.

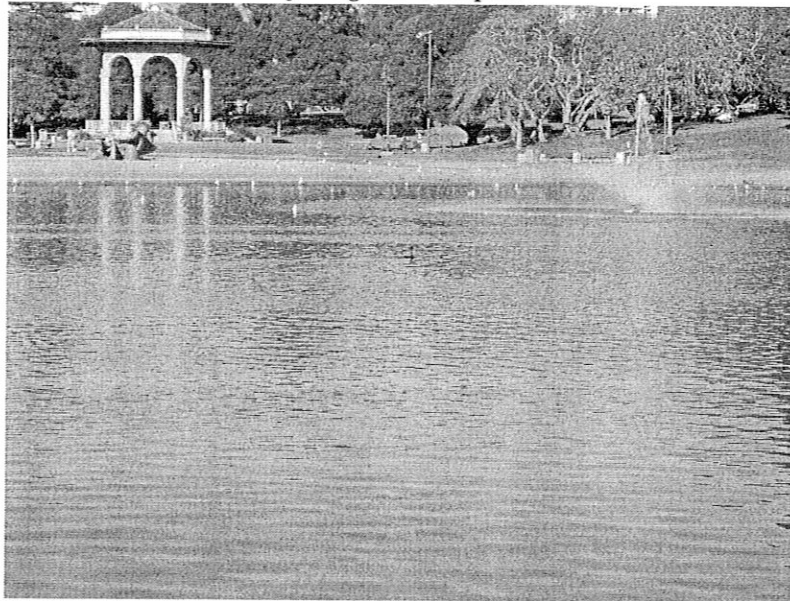
From November 7 to November 21 the D.O. levels increase in Lake Middle. I think the D.O. levels fluctuated after the "Big Flush", because the Big Flush happened on November 6, 2002. The Big Flush did affect the middle of the lake. The D.O. levels decreased. Sample not collected on November 28.

At Lake Middle part of the Lake, the D.O. levels are high enough for aquatic life. Aquatic life needs between 6-18 ppm of D.O. When I compare the D.O. levels of my part of the Lake with the other parts it is somewhat similar. The highest D.O. level at Lake

Merritt was found at Lake Middle. It was 11.4 ppm on November 21. The lowest D.O. level at Lake Merritt was found at Storm Drain 56. It was 1.2 ppm on October 31. My data was different. The healthiest part of the lake is Lake Middle. The unhealthiest part or parts of the lake are Trestle Glen Arm.



*This is a photo of me, Angelica and Mable my group members.
We are fixing our sample.*



This is a photo of the bandstand in Lake Merritt.

Acknowledgements

By: Mayra

There are many people I would like to appreciate. Many people helped me learn about Lake Merritt. First I would like to appreciate Ms. Kretschmar for supporting all the 6th graders everyday at the lake and during class. Next, I would like to appreciate Kristin Hathaway for teaching the 6th graders at Lighthouse how to use a Dissolved Oxygen Kit. Also, Dr. Bailey for letting the 6th graders go to Lake Merritt to test the dissolved oxygen and going to clean the lake. Last, I would like to thank my group mates for being patient with each other, and collaborating with each other. I appreciate all of the people for helping me. Thank you.