

# “TIDINGS”

## THE LAKE MERRITT INSTITUTE

A COMMUNITY BASED, NON-PROFIT CORPORATION, ESTABLISHED 1995

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**CLIMATE CORNER – By Dr. Richard Bailey - Book Review: *Atmosphere of Hope, Searching for Solutions to the Climate Crisis* by Tim Flannery:** The author of the number 1 international best seller “The Weather Makers” has been busy, and he has found a way to give us hope. The hope is based on the concept that natural and human assisted sequestration (carbon capture and storage) is, although expensive, a possible way to lower carbon levels in the atmosphere. A study in Australia found that if the **dangerous** 2°C warming is to be avoided, direct carbon dioxide capture from the air, together with subsequent sequestration, would eventually have to be introduced. In other words, in addition to emission reductions, we need to take carbon out of the air, a lot of carbon. Flannery writes:

“Is it possible for planetary processes to remove greenhouse gases from the air at a scale, rate, permanence, and cost that will make a difference to our future climate? The answer, I found, is an emphatic yes.”

In addition to just adapting or geoengineering, *Atmosphere of Hope* promotes a third way, which is “a new concept, encompassing proposals and experiments that shed light on how Earth’s natural system for maintaining the carbon balance might be stimulated to draw CO<sub>2</sub> out of the air and sea at a faster rate than occurs presently, and how we might store the recovered CO<sub>2</sub> safely.” You will have to read the book to digest what these methods could be, but start by considering sequestration below the ocean, which can be, due to the pressure of water, safer than storage in on-land based geological formations.

Climate Hope: So if both emission reductions and carbon removal are needed, how can we fund them both? Scientists and economists agree that we must put a price on carbon emissions. This price would be part of the cap, as in cap and trade. But *there is a better way to price carbon*, avoid the politically unacceptable cap, and the complex trading mechanisms which can be gamed. This way is called the *Carbon Fee and Dividend*.

If implemented, one of the most powerful forces on the planet – the economy – would create advantages for technology to reduce emissions. Give the money collected from the carbon price back to every household as a monthly dividend check in their mail boxes, and you would actually stimulate the overall economy. As the fossil fuel industry shrinks, their substantial subsidies will no longer be needed, and these could fund an industry in CO<sub>2</sub> capture and storage.

Re-direction of fossil fuel subsidies to carbon capture and storage is not yet on the table, but a carbon fee and dividend proposal has been put forth by the Citizens’ Climate Lobby (CCL). For the sake of the children now being born, and who are likely to live until the year 2100, join CCL. It doesn’t cost anything to join, and you will sleep better at night knowing that you are part of a rapidly growing movement to save the planet.

**BIRD COLUMN: Winter's Coming, and Lake Merritt Is Glad – By Hilary Powers -** The species count for the 4th-Wednesday Golden Gate Audubon bird walk jumped all the way to 48, including Lesser Scaup (the more pointy-headed of the black and white diving ducks), Bufflehead (a female, brown instead of black and white and with a white spot behind the eye) and Canvasbacks (two sand-colored females) - all rarely seen this early in the season. The Greater Scaup and Ruddy Ducks were both on the lake for the first time this year, in substantial numbers, joining the hordes of American Coots, Pied-billed Grebes, and Canada Geese who'd been around for a while.

The Double-crested Cormorants had almost entirely moved out of the trees, but filled the floats - neatly spaced a wingspan apart with almost mechanical precision. Assorted gulls and crows were picking through the branches for tidbits left behind, and at the very top of one of the trees, a Great Blue Heron crouched in a nest as though checking out the real estate. That was the only Great Blue Heron, but we saw a lot of egrets - both Snowy and (less commonly, these days) Great, along with several Black-crowned Night-Herons and two Green Herons.



Great Blue Heron in flight; photo by Marc Crumpler; <http://fineartamerica.com/profiles/marc-crumpler.html>

A big flock of Pine Siskins - the first of these goldfinch-relatives ever seen on the 4th-Wednesday walk - cycled through the treetops around the garden. Lower in the trees (and on the fences, and on the ground) we had bunches of Yellow-rumped Warblers demonstrating why they're the most common warbler hereabouts: unlike other warblers, which tend to specialize on one sort of diet or another, your butter-butt will eat pretty much anything it can get its beak around in any part of its environment. They were joined by White-crowned Sparrows in slightly less large bunches, plus a couple of Golden-crown Sparrows and a burglar-masked Townsend's Warbler. Among the bushes, we were treated to the sight of a single Bewick's Wren flashing its white eyebrow, and an unusual lone Dark-eyed Junco - no telling where the rest of the flock had gotten to. And of course there were crows, lots and lots of crows carpeting the lawns and racketing around the treetops, harassing a Cooper's Hawk and otherwise amusing themselves.

All told, it was a pretty, pretty day, despite (or perhaps because of) a few drops of much-needed rain, well up to the standard at Lake Merritt, where every day is a good day.

**ADEQUATE LAKE OXYGEN AN ONGOING CHALLENGE** – The internationally famous geotechnical and engineering firm of Amec Foster Wheeler (Based in London with a local office in Oakland), was tasked by the Bureau of Engineering and Construction, Public Works Department, City of Oakland, to monitor Lake Merritt water quality, including lake oxygen levels, and make recommendations. They are now in the draft phase of completing their report: “2014 to 2015 Water Quality Monitoring Report; Lake Merritt Monitoring, Oakland, CA”. Following the review and summation of comments from alternate engineers/hydrologists, their report will be released in mid- to late-November.

As background, oxygen in water is measured as “dissolved oxygen” (DO) in “parts per million” (ppm). State water quality standards list a DO of 20 ppm as being very healthy, and 5 ppm is considered a minimum for natural bodies of water. When DO values fall below 3 ppm problems can occur, such as death of fish and other aquatic life, and the production of malodorous gases such as hydrogen sulfide. Of importance is to realize how much DO values can vary depending upon location on the lake as well as depth. On the whole DO values are highest where there is the greatest tidal flow. Therefore, DO levels tend to be the highest near the 7<sup>th</sup> Street channel to the Oakland Estuary. Further, due to the shape and depth of the lake, tidal flow favors the Trestle Glen Arm and barely impacts the Glen Echo Arm. Thus DO values tend to be more favorable on the East side with West side values much lower. Also, DO values tend to fall with increased depth (greater distance from surface atmospheric interaction). Therefore, it is the lower depth areas of the Glen Echo Arm that generally suffer the lowest DO values in the lake (historically 2 ppm or lower).

The principal natural sources of oxygenation for the lake are (again) tidal flow, surface exposure to the atmosphere, and oxygen-rich rain from passing storms. The main sources of oxygen depletion are blooms in aquatic life, seaweeds, and algae; which have short life-cycles, rapid die-off, and then sink to the bottom, and decay. Further, more oxygen depleting, decaying vegetation is added to the lake during the rainy season from the large network of storm sewers that serve the Lake’s drainage basin. Thus, the rains giveth and taketh away!

The LMI’s three aeration fountains play a significant role maintaining minimum DO levels. Fine drops of water blown into the air, like rain drops, collect oxygen and deliver it to the lake. However, regrettably, the fountains are barely delivering enough – and at relatively high cost. The electric aeration fountains require electric lines and water pumps that must be rated for both underwater and saltwater use. Further, drawing lake water and running it through pumps results in the pump chambers rapidly becoming encrusted with marine life. Thus, frequent required maintenance (see following article), and rapid degradation and failure of components, is significant.



(Continued)

(“...Lake Oxygen...”; Continued)

Years ago LMI experimented with a few “bubble mats” that seemed to be effective. Off-shore cables and pumps (saltwater ratings not necessary!) pumped ambient air through pneumatic hoses to small rubber diaphragms (which did not experience blockages by aquatic life-forms!) anchored on the bottom of the lake. Small perforations in the diaphragms allowed the air to escape in the form of small bubbles. The bubbles would deliver oxygen to the lake water as they surfaced. Perhaps, some day, the bubble mats will be brought back.

It is anticipated that the final Amec Foster Wheeler report will describe possible improvements for the management of the 7<sup>th</sup> Street flood control gates so as to maximize the mixing and oxygenating effect of lake tidal flows. Further, the study might identify the use of hydraulic devices capable of “de-stratification”. Such devices will elevate over-all DO levels by simply churning lake waters by pushing deep, low-oxygenated water up to the surface where it can interact with the atmosphere.

The path to solving the lake oxygenation levels may soon be at hand.

**OLD ROOT-BALL SNAG OR AERATION FOUNTAIN ?** - Darn! Aeration fountain! With our warm weather comes warm lake water temperatures, and warm temperatures bring robust blooms of sea life – and at a time when corresponding peak levels of rotting vegetation do their best to consume the lake’s meager volume of oxygen. So the race is on to keep all pumps in full operating condition. That means that LMI’s three aeration fountains must be thoroughly cleaned of biota once a month. The pumps are pulled from the lake so encrusted with limpets, tube worms, sea squirts, barnacles, mussels, and more, that lay persons would probably guess “old root-ball snag”! It takes hours of scraping and spraying with high-pressure washers to return the pumps to their full capacities of operation. Thank you, LMI!

**AROUND THE LAKE** – In late October Susan Porter, middle school teacher from nearby St. Paul’s Episcopal Church, brought in about a dozen volunteers from her class to help clean the lake. Her crew had a rousing time collecting lost oddities including some lost treasure on the Embarcadero side: an odd collection of pennies and foreign coins. Thank you, St. Paul’s!



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