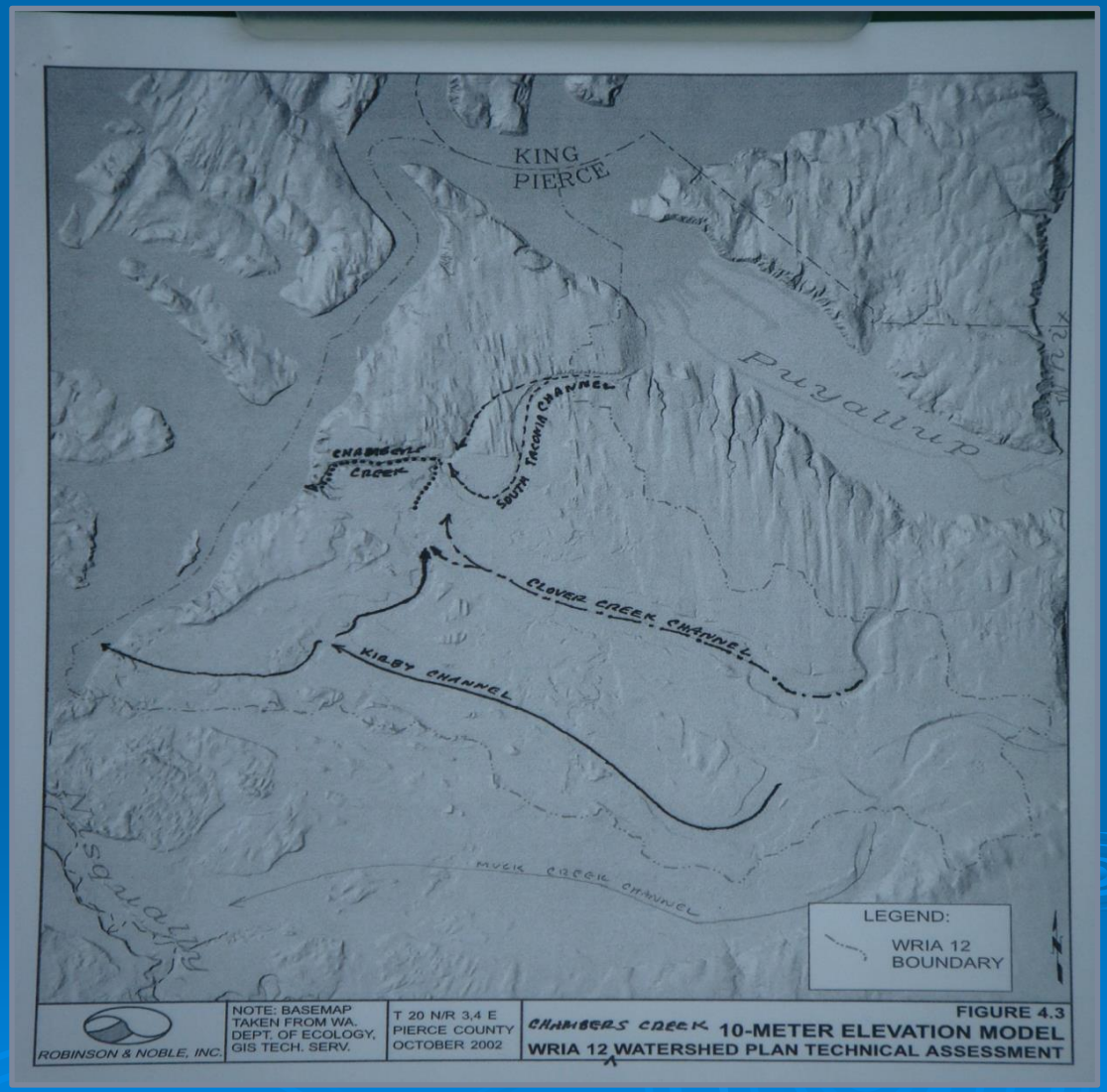
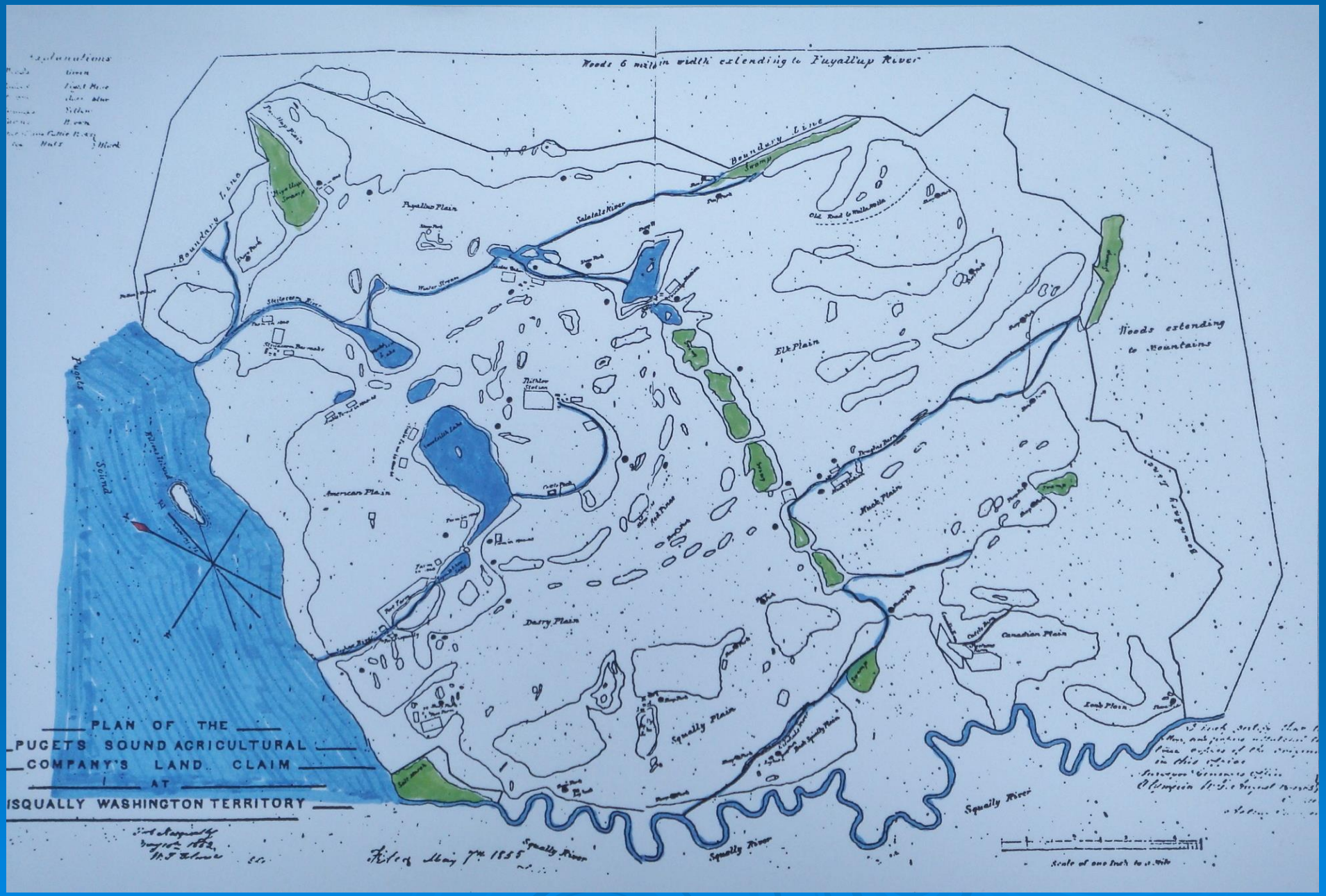
Lakes of Lakewood

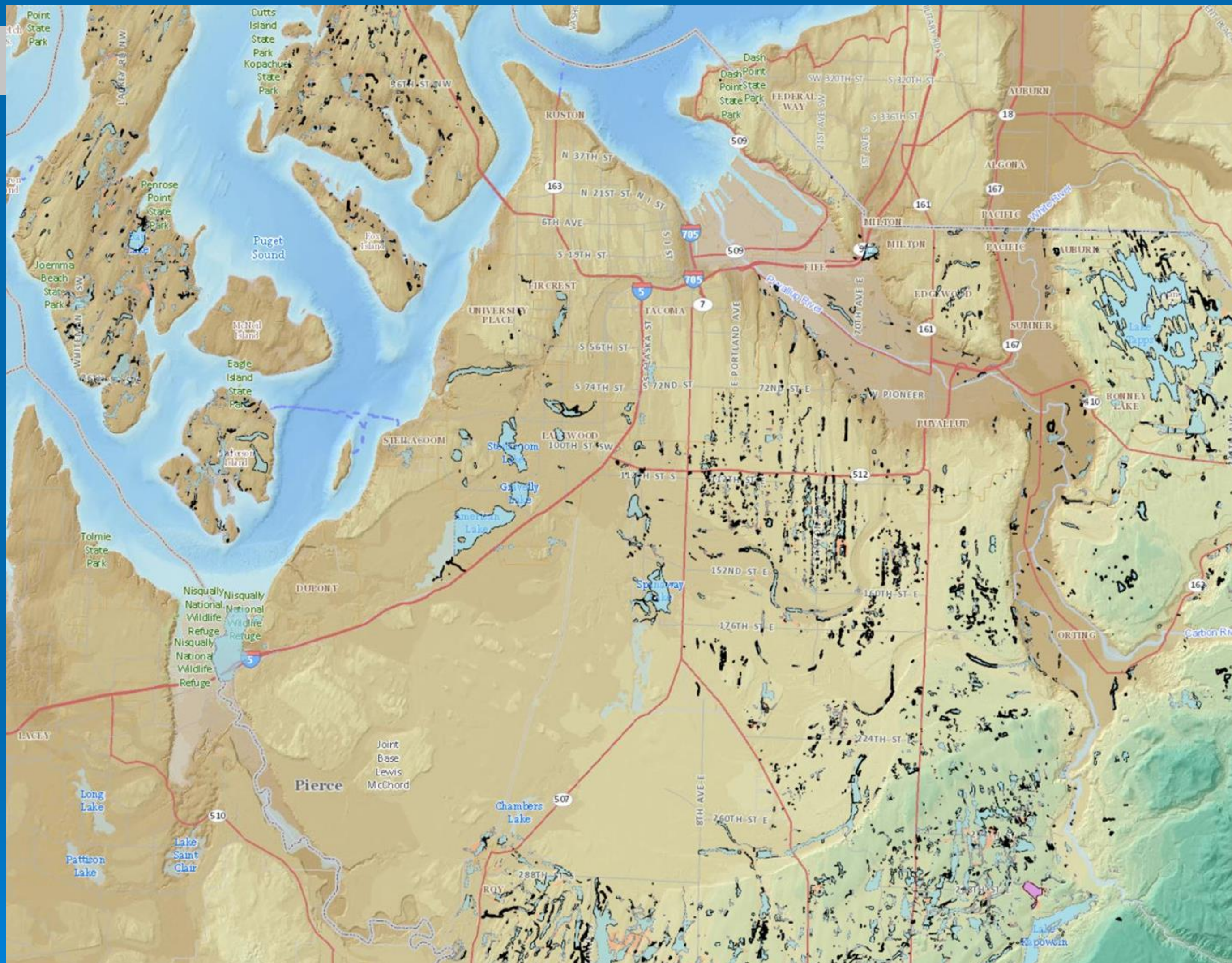
PLU 11/20/19 - Kris G. Kauffman, P. E.

- What Lakes are in Lakewood?
- What uses are made of the lakes?
- Where does the water come from; and, where does it go?
- Some of Lakewoods' lakes physical characteristics over time (glaciations, floods, fires, level controls and groundwater)?

“Greater” Lakewood View with Lidar Scan




Explanations
Woods 6 miles in width extending to Puyallup River
Boundary Line
Boundary Line
Swamp
Puyallup Plain
Puyallup River
Salalal River
Old Road to Mukilteo
Steilacoom River
Water Stream
Elk Plain
Woods extending to Mountains
Steilacoom
Sound
American Plain
Muck Plain
Dairy Plain
Canadian Plain
Squally Plain
Squally River
Squally River
Squally River
Scale of one inch to a mile
PLAN OF THE
PUGETS SOUND AGRICULTURAL
COMPANY'S LAND CLAIM
AT
SQUALLY WASHINGTON TERRITORY
Fort Nisqually
August 1st 1852
U.S. Volume
Rivers May 7th 1855



Cutts Island State Park
Kopachuck State Park
Dash Point State Park
Penrose Point State Park
Puget Sound
Joemma Beach State Park
McNeil Island
Eagle Island State Park
Tolmie State Park
Nisqually National Wildlife Refuge
RUSTON
N 37TH ST
N 21ST ST
6TH AVE
S 19TH ST
FIRCREST
UNIVERSITY PLACE
TACOMA
S 56TH ST
S 74TH ST
S 72ND ST
72ND ST E
FEDERAL WAY
SW 320TH ST
S 320TH ST
S 336TH ST
AUBURN
ALGONA
PACIFIC
MILTON
FIFE
EDGEWOOD
SUMNER
PUYALLUP
PIONEER
BONNEY LAKE
White River
Puyallup River
LAKEWOOD
100TH ST SW
STEILACOOM
Steilacoom Lake
Gravelly Lake
American Lake
112TH ST S
152ND ST E
160TH ST E
176TH ST E
224TH ST E
260TH ST E
288TH
DUPONT
LACEY
Long Lake
Pattison Lake
Lake Saint Clair
Pierce
Joint Base Lewis McChord
Chambers Lake
Spanaway Lake
ORTING
Carbon River
Lake Kapowsin
ROY
8TH AVE E

American Lake

Lake Steilacoom

Gravelly Lake

Lake Louise (Balch)

Waughop Lake (winter)

Seeley Lake

Wards Lake

Wards Lake again

Carp Lake

Carp Lake (drought period – June 2001)

Barlow Pond (Hidden Lake)

The Lakes of Lakewood

Lakes	Elevation**	Area (acres)***	Depth (feet)	Vol. (AF)
American Lake	231’	1,100	90	60,000*
Lake Steilacoom	205.4’	320	20	3,500
Gravelly Lake	210.6’	160	55	6,000
Lake Louise (Balch)		39.1	35-s	888
Waughop Lake (Mud Lake)		33	14	220
Seeley Lake		30 e	sh	
Wards Lake (Owens marsh)		11.4	sh	
Carp (Terry) Lake		11	sh	
Lost Lake		10 e	sh	
Emerson Lake		4.6	sh	
Barlow Pond (Hidden Lake)		3.1	20-e ~gravel pit?? kgk	
Mud Lake		3 e	sh	
Boyles Lake		2.8	sh	
Perkins Lake(last of 14 named lakes)		1.5	sh	
Miscellaneous Stormwater Ponds		70 e	sh	

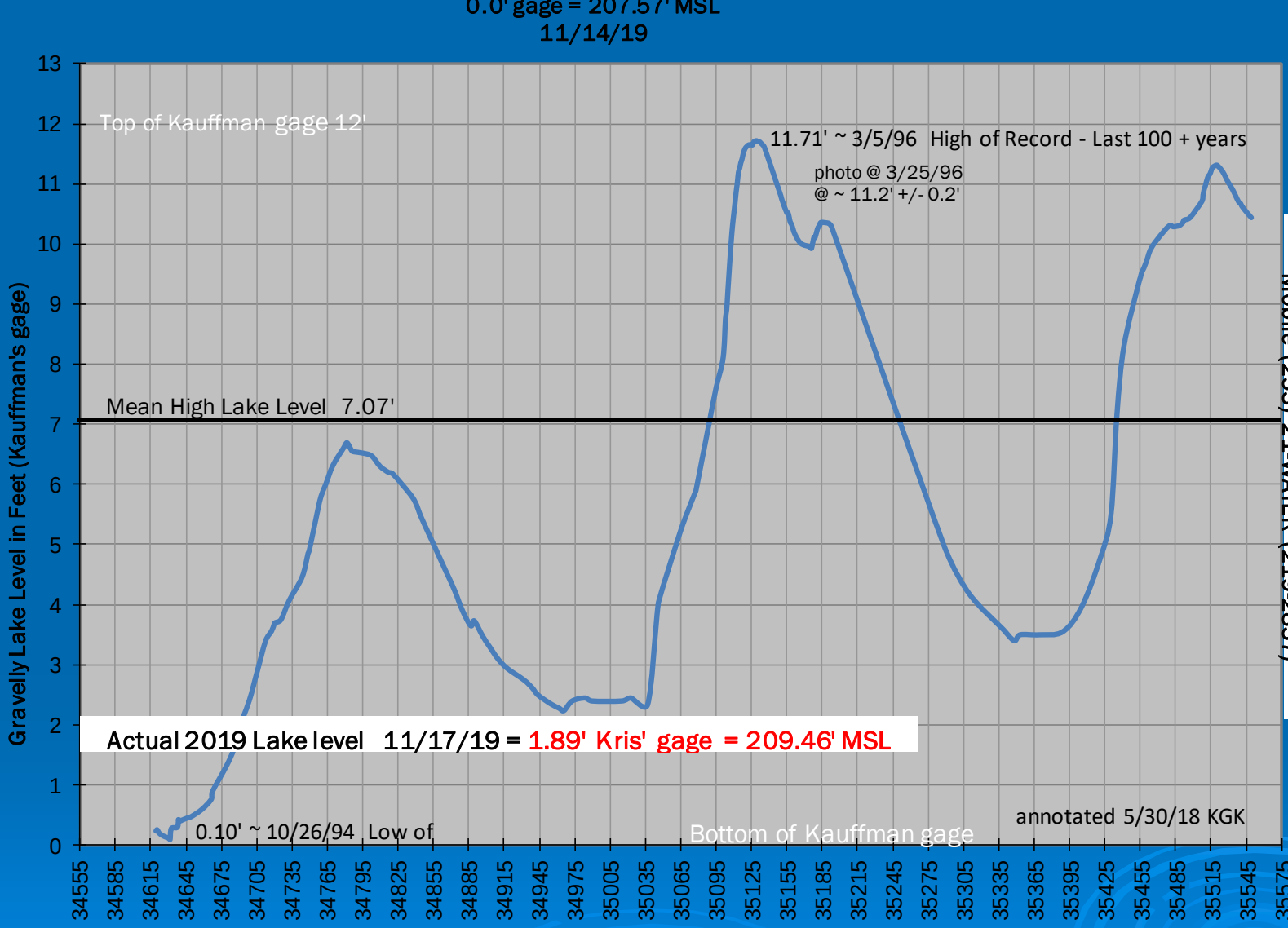
* Largest natural lake in Pierce County (Lake Tapps is a Reservoir &= 67,000 AF)
** levels on ~ 8/11/19 kgk
***Lakewood Lake Area=1,700 acres=2.7 square miles (city=20sm;Q=13.5%)

Uses of Lakes of Lakewood Over Time

- Food source and transportation
- Power (Byrd grist and lumber mill - 1852)
- Irrigation (lawn and golf courses)
- Stormwater and wastewater disposal (less now re 1986 diversion: ~24,000 AF)
- Recreation (boating, fishing, water skiing, swimming, sailing, wake/surf boards, etc.)
- Stock-15K+ & wildlife (Otter/Osprey) water
- Aesthetics (sun rises/sets;to each its' own)
- Mythology and Arguments(legal, people +)

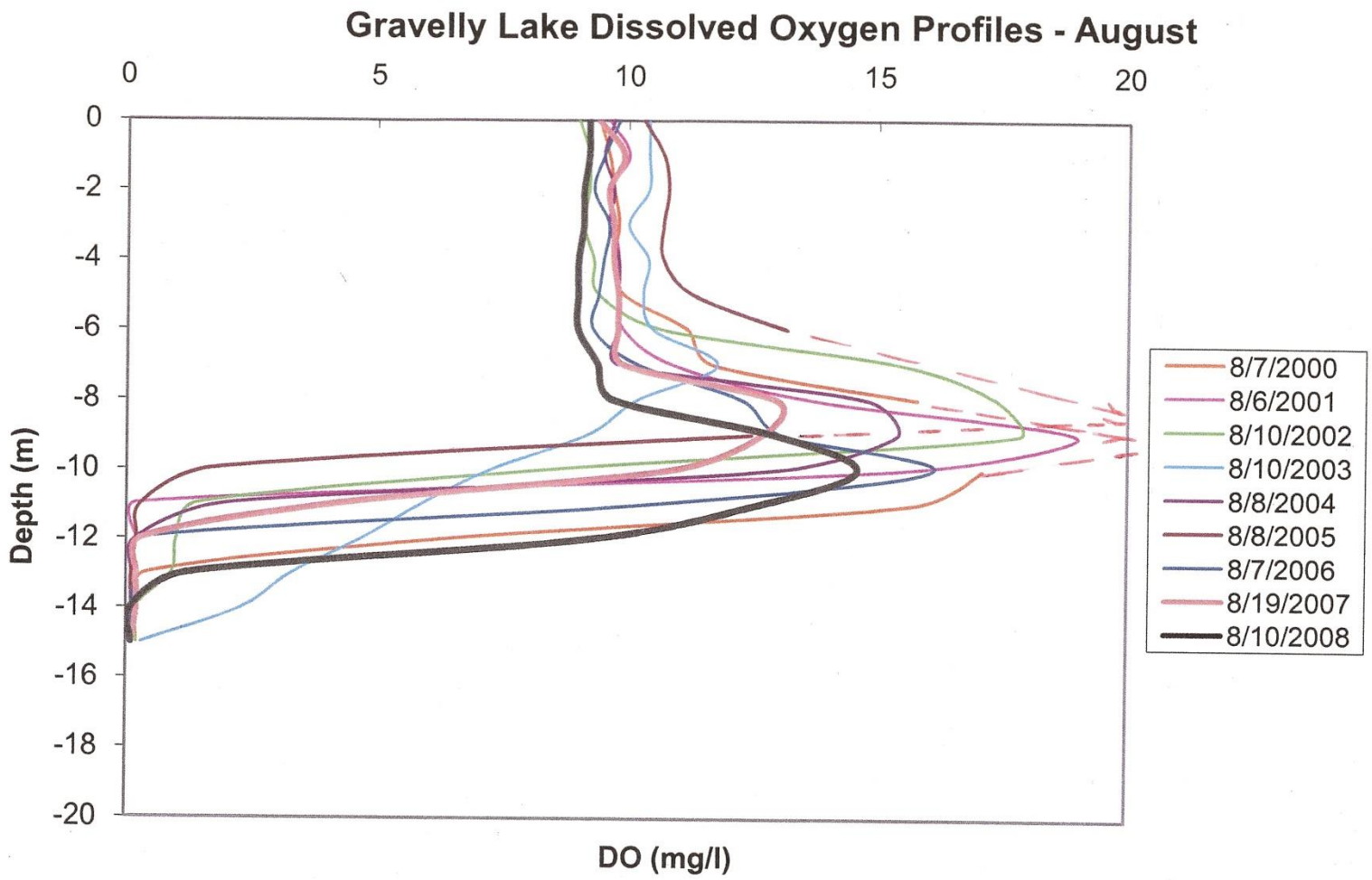
Where does the water come from; and, where does it go?

- Precipitation - this basin, not Mt. Tahoma!!
- Importation – from Tacoma - storm & supply
- Evaporation / Transpiration – 1850's -/+
- Consumption (stock, M & I, Groundwater…)
- New Water Rights (none after Nov. 1979)
- Sewer System to Puget Sound – 1986



Water Rights, Inc.
12228 Nyanza Rd. SW * Lakewood, WA 98499
Office (253) 581-9752
Mobile (253) 21-WATER (219-2837)

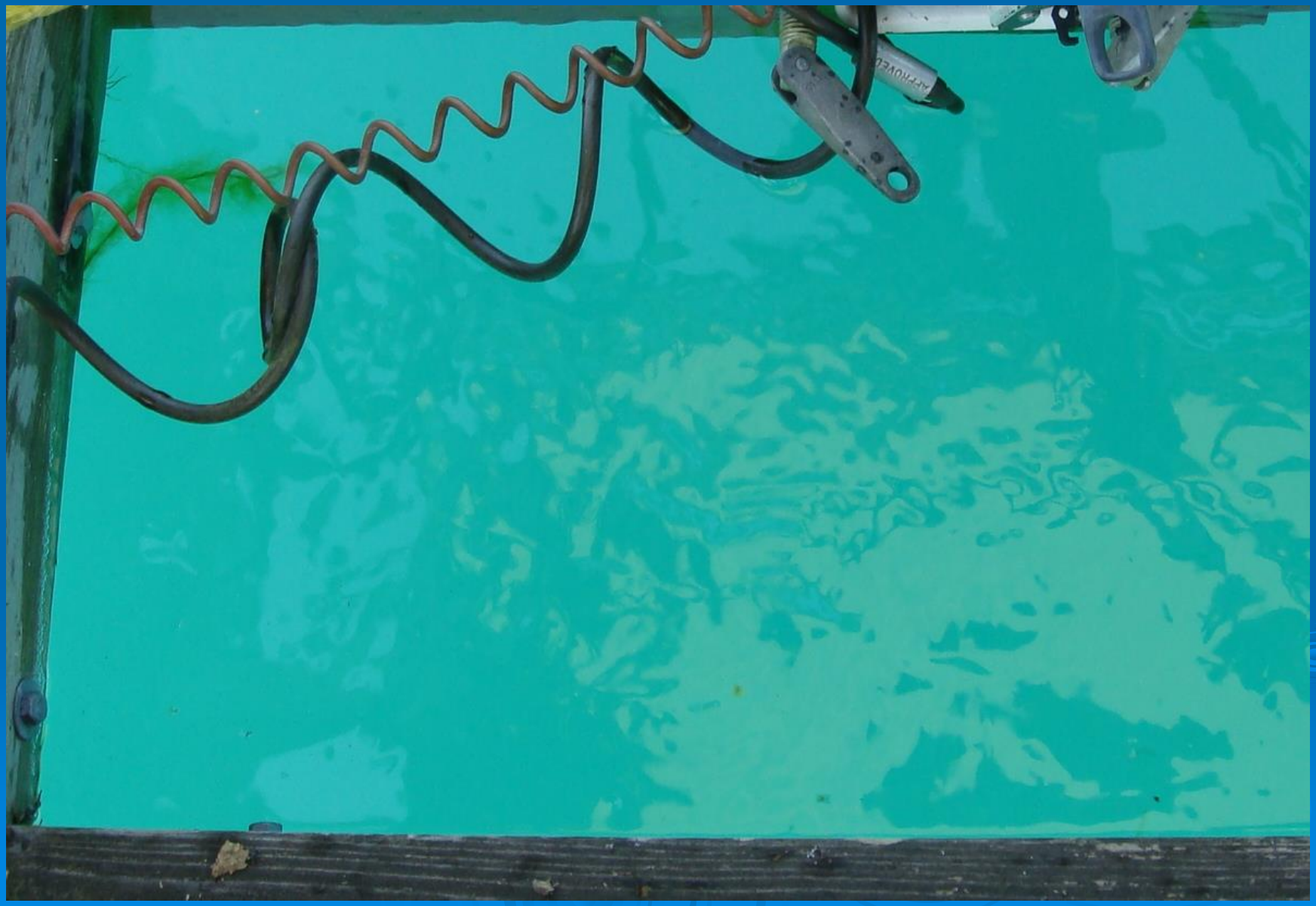
Gravelly Lake Dissolved Oxygen vs. Depth from surface



Calcium Carbonate Deposit on Plants

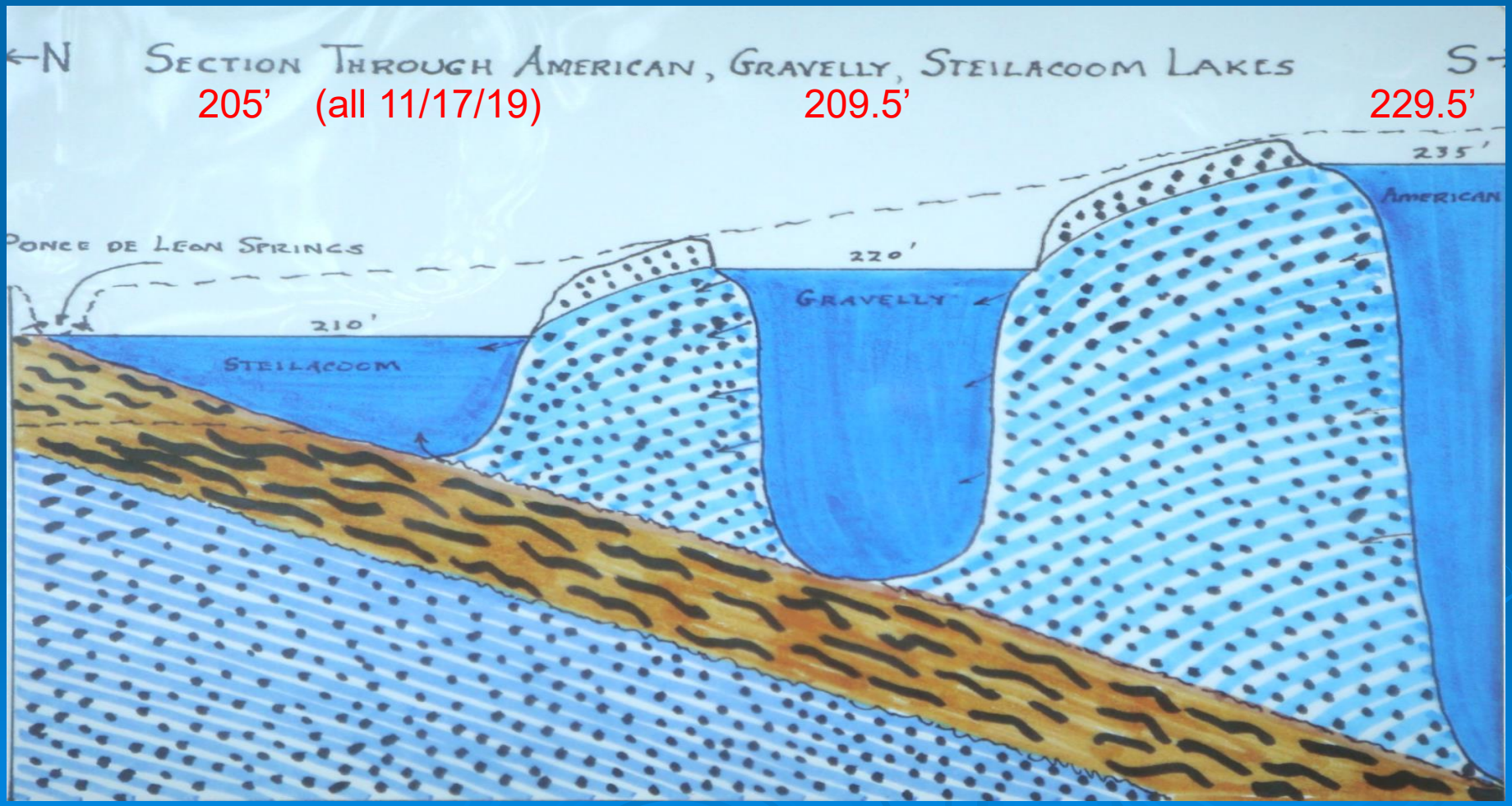
Gravelly Lake (Summer 2009)

Gravelly Lake



Relative Lake Levels per USGS Topo and Kauffman 11/17/19

Not to scale horizontally or vertically - KGK



What is the future of our Lakewood Lakes?

Your Choice and The End

What are some of the Lakes Physical Characteristics over Time

Gravelly Lake, history reports, had the Indian name "Cook-al-chy" meaning pond lily.

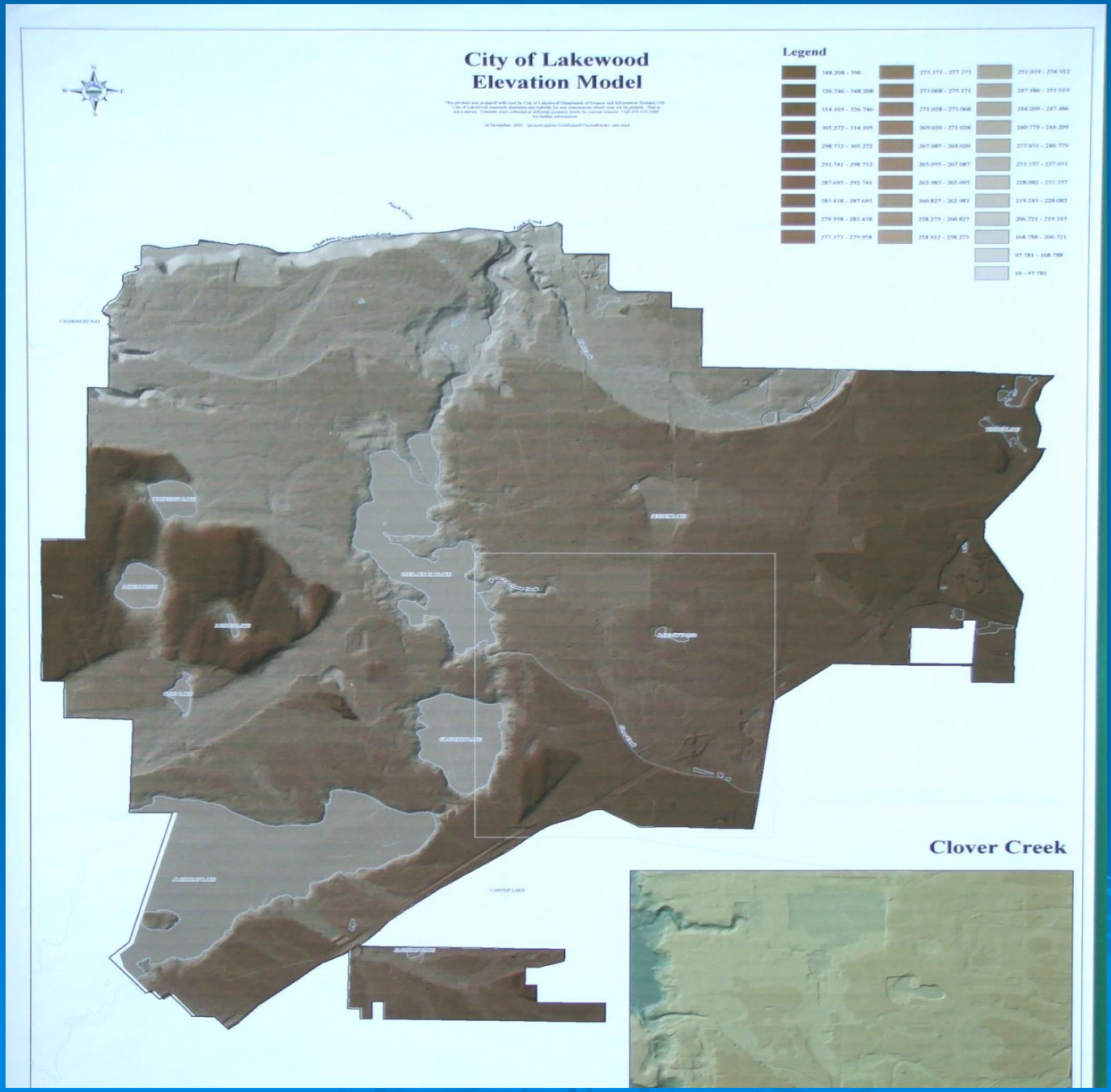
American Lake is about 90 feet at its deepest point; Gravelly Lake about 60 feet, and Steilacoom about 24 feet. They all rest at different points above mean sea level – American 247.4; Gravelly, 229.3 and Steilacoom, 219.8 as of 1916.

Current levels (MSL-29NAVD) are American Lake at 229.5'; GL at 209.5' (11/11/19–Monday); and Steilacoom Lake 205' MSL (AL–20'=GL & GL- 4.5'=LS level) .

The difference between the high and low levels of Gravelly Lake has been up to ~11.61 feet, while the rise and fall of American and Steilacoom Lakes is only about three +/- feet, with the levels controlled by the inflow of groundwater and surface water from Maury (AL), Clover and Ponce de Leon Creeks (SL), irrigation, evapo-transpiration and (legal) outflow stoplog settings at the outlet dams.

The local lakes were formed when huge glaciers covering the area left blocks of ice to melt thus forming depressions for the lakes. According to Ken Walters, geologist with the United States Geological Survey office in Tacoma, "These types of lakes could only be formed in an area of substantial gravel deposits. Lakewood has the best gravel in the state, more than 100 feet deep in areas," he explains. And that's just on the surface.

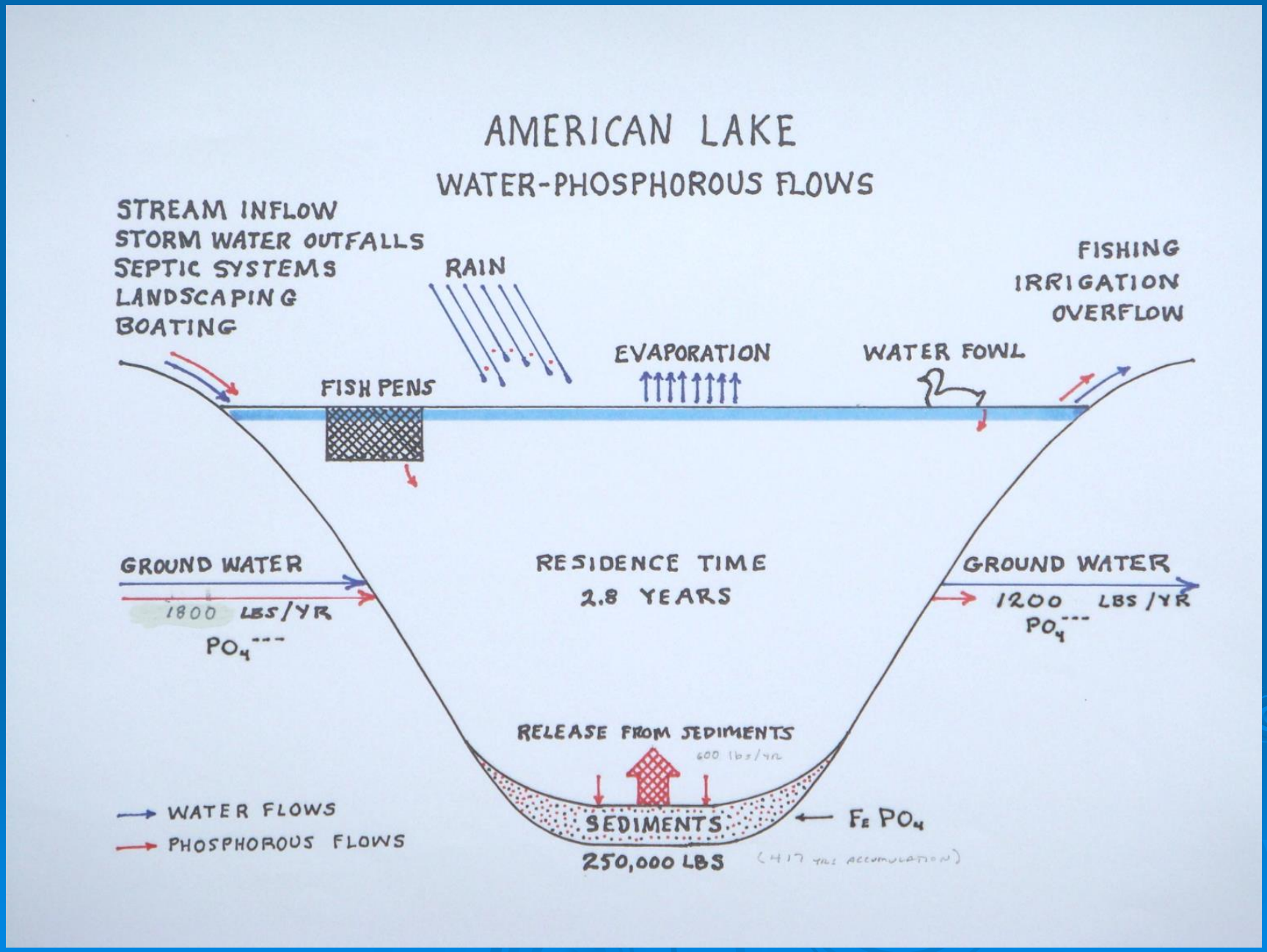
Source: Suburban Times June 29, 1967 with Kris Kauffman update 11/14/19


City of Lakewood
Elevation Model
Legend
348.208 - 396
326.746 - 348.208
314.105 - 326.746
305.272 - 314.105
298.732 - 305.272
292.741 - 298.732
287.695 - 292.741
283.438 - 287.695
279.958 - 283.438
277.371 - 279.958
275.171 - 277.373
273.068 - 275.171
271.028 - 273.068
269.030 - 271.028
267.087 - 269.029
265.095 - 267.087
262.983 - 265.095
260.827 - 262.983
258.275 - 260.827
254.912 - 258.275
251.919 - 254.912
247.486 - 251.919
244.209 - 247.486
240.779 - 244.209
237.031 - 240.779
233.357 - 237.031
228.082 - 233.357
219.245 - 228.082
206.721 - 219.245
168.788 - 206.721
97.781 - 168.788
69 - 97.781
Clover Creek

What are the Lake's chemical/biological characteristics?
(After 20 years of data!!!)

Examples and processes (diatoms)

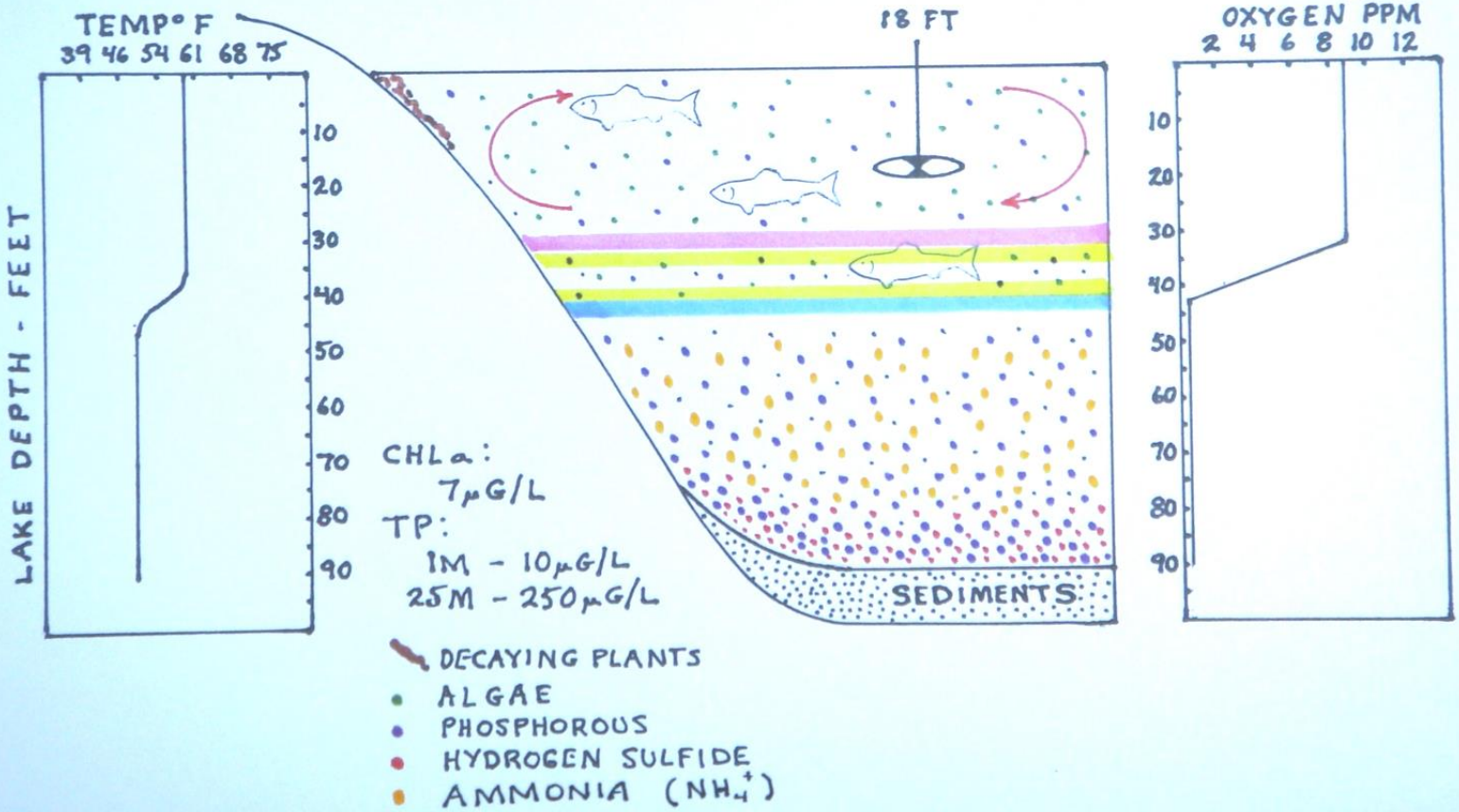
MAYBE


AMERICAN LAKE
WATER-PHOSPHOROUS FLOWS
STREAM INFLOW
STORM WATER OUTFALLS
SEPTIC SYSTEMS
LANDSCAPING
BOATING
RAIN
FISHING
IRRIGATION
OVERFLOW
EVAPORATION
WATER FOWL
FISH PENS
GROUND WATER
1800 LBS/YR
PO_4^{---}
RESIDENCE TIME
2.8 YEARS
GROUND WATER
1200 LBS/YR
PO_4^{---}
RELEASE FROM SEDIMENTS
600 lbs/yr
SEDIMENTS
250,000 LBS
(417 yrs accumulation)
$Fe\ PO_4$
WATER FLOWS
PHOSPHOROUS FLOWS

Filamentous Green Algae

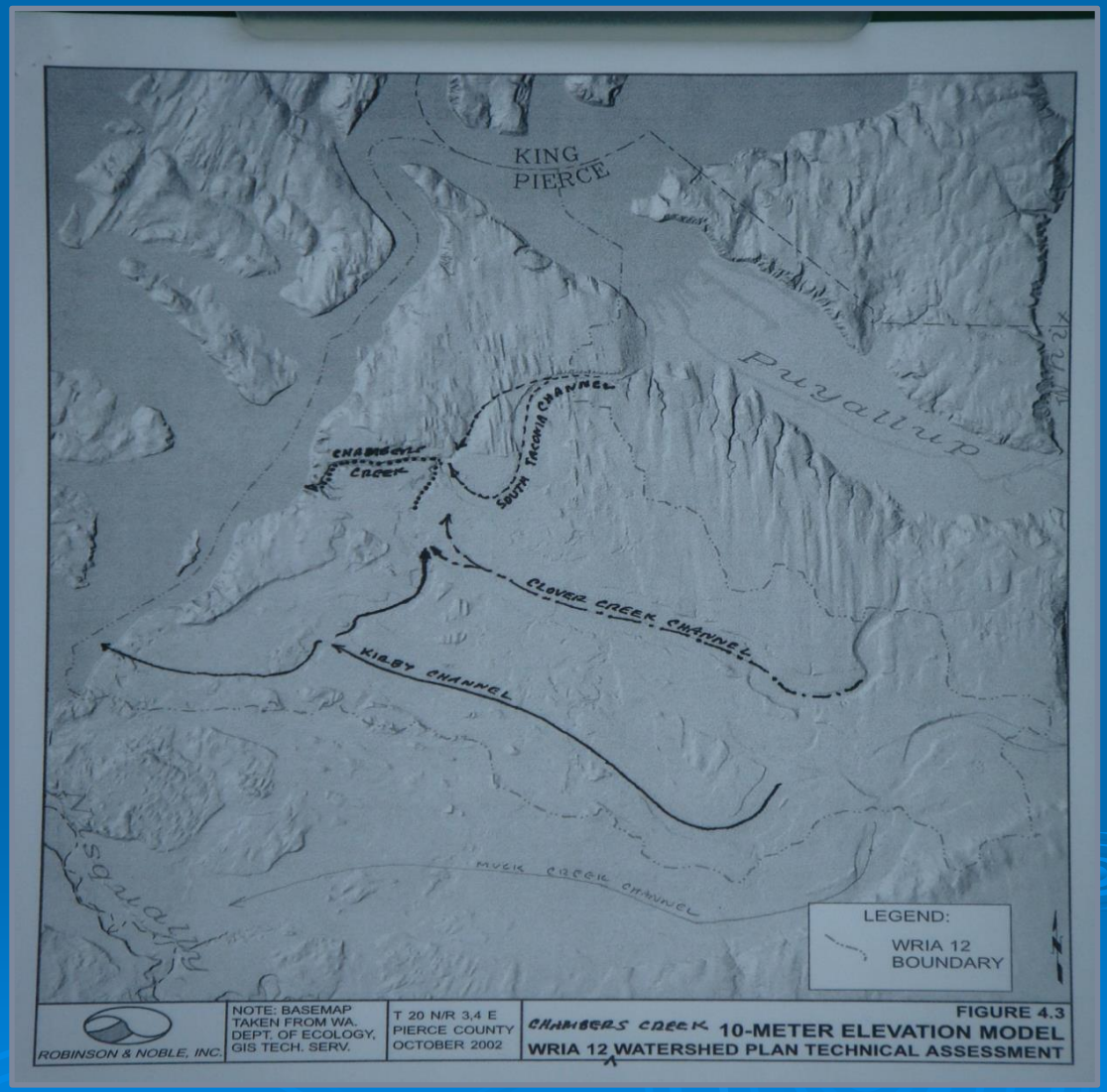
AMERICAN LAKE

FALL



Blue-Green Algae

“Greater” Lakewood View with Lidar Scan



Lake Steilacoom (late summer)

Lake Steilacoom (late summer)

10/19/04

STEILACOOM LAKE

Toxic algae claims another family pet

Blue-green algae in Steilacoom Lake likely killed a family dog. Lake homeowners are running out of options to treat the toxic algae.

BY ANGIE LEVENTIS
The News Tribune

When Bailey, a 65-pound chocolate Lab and Doberman mix, wandered away from her owners recently, she found her way to Steilacoom Lake and drank some of its algae-infested water.

Michelle Cullinane found her dog vomiting a few hours later and the family took her to the veterinarian.

Bailey died the next afternoon, about 15 hours after drinking the lake water.

"We look at the lake differently now," Cullinane said. "It used to be so beau-

Photo courtesy of Cullinane family

Michelle Cullinane's dog Bailey drank Steilacoom Lake water and died.

10/19/2004

Waughop Lake (Summer)