

GGLSA Presentation to:

**Colorado Department of Public Health and Environment
January 25, 2007**

Attendees:

GGLSA

K. John Stahl, President
Richard McQueary, Director
Steve Paul, Director
John Brooks, Member

Three Lakes Watershed Association
Canton O'Donnell, Director

Grand County Government
Barbara Green, Counsel
Sarah Clements, Director, GCWIN

McLaughlin Rincon
Ron McLaughlin, Principal

CDPHE

Steve Gunderson, Director, Water Quality Division
Paul Frohardt, Administrator, Water Quality Board
Joni Nuttal, Staff Member
Daniel Beley, Staff Member
James Saunders, Staff Member

Grand Lake Water Quality, Post-C-BT

- 1946 Adams tunnel break-through achieved; Shadow Mountain Dam completed¹
- 1947 First flow through Adams tunnel
- 1951 Granby Pump Plant commissioned, initiating reverse flow from Granby Reservoir
- 1952 Algae blooms reported in Grand Lake and Shadow Mountain Reservoir²
- 1955 Pennak suggests that eutrophication in Grand Lake is due to inflow from Shadow Mountain Reservoir. “Results of his study generally bear out his contention.”³

Algae blooms in the years immediately following the commencement of reverse flow were attributed to nutrients on the floors of the new reservoirs being pumped into Shadow Mountain Reservoir and Grand Lake.

As blooms continued later in the 1960s awareness began to build that sub-standard waste treatment influx into Shadow Mountain Reservoir could also contribute to degrading water conditions⁴. “Orthophosphate concentrations in all three lakes were close to or exceeded the minimum said to be necessary to initiate algae blooms”. “Continued enrichment could have serious consequences for Grand Lake”.

- 1971 Three Lakes Water and Sanitation District formed.
- 1977 EPA evaluated phosphorus loading against “permissible” and “dangerous” loadings and concluded that “there is an obvious potential for future problems if nutrient loadings are increased.”⁵ Yahnke’s Table 2 shows that the phosphorus loading in Grand Lake would double with the Windy Gap Project, with 2/3 of the phosphorus loading entering Grand Lake from Shadow Mountain Reservoir.
- 1981 Construction begins on Windy Gap; operational in 1985.⁶
- 2000 NCWCD and the Bureau of Reclamation co-sponsor a study⁷ concluding that water quality is improving and that no downward trends are detectable. Grand Lake is not included in the study.
- 2003 Hydrosphere study conducted for NCWCD Technical Advisory Team⁸. Total phosphorus in Grand Lake is expected to increase by 50% in the next ten years with existing flows, and to double with Firming Project flows.

¹ Colorado-Big Thompson Prject, Bureau of Reclamation History Program, Robert Autobee, 1996 available at <http://www.usbr.gov/dataweb/html/cbt1.html#CO>

² Comparative Limnology of Colorado-Big Thompson Reservoirs and Lakes, Wesley C. Nelson, 1971; citing D.E. Roberts, 1952; Project Report Grand Lake, Shadow Mountain Reservoir and Granby Reservoir Fish Management Investigations

³ Comparative Limnology of Colorado-Big Thompson Reservoirs and Lakes, Wesley C. Nelson, 1971; citing R. W. Pennak, 1955, Comparative Limnology of Eight Colorado Mountain Lakes.

⁴ Comparative Limnology of Colorado-Big Thompson Reservoirs and Lakes, Wesley C. Nelson, 1971; citing Timm, C. M. and Seeley, C. M., 1970 “Water Quality Conditions in Grand Lake, Shadow Mountain Lake, Lake Granby. Environmental Protection Agency, Water Quality Office

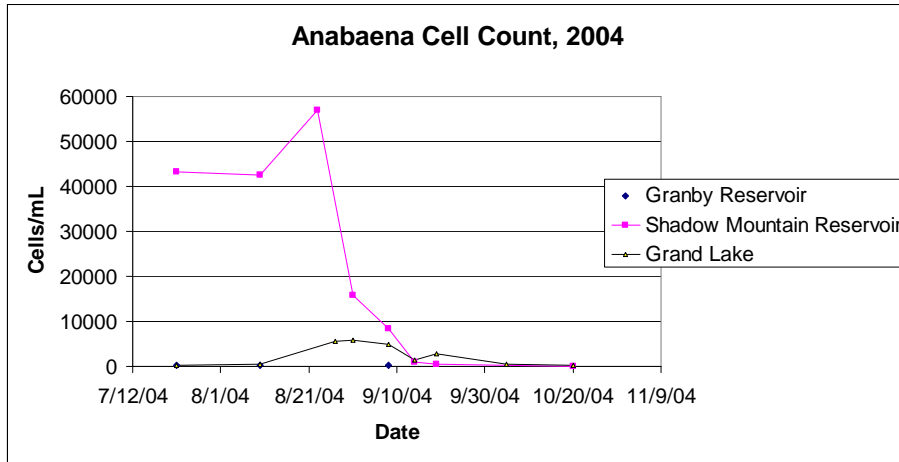
⁵ Potential Impact on Trophic State and Algal Standing Crop of the Three Lakes System due to Windy Gap Diversions, J. W. Yahnke, 1981, citing 1977a and 1977b Reports on the Three Lakes by the EPA.

⁶ NCWCD project history, available at: http://www.ncwcd.org/project_features/wgp_historical.asp

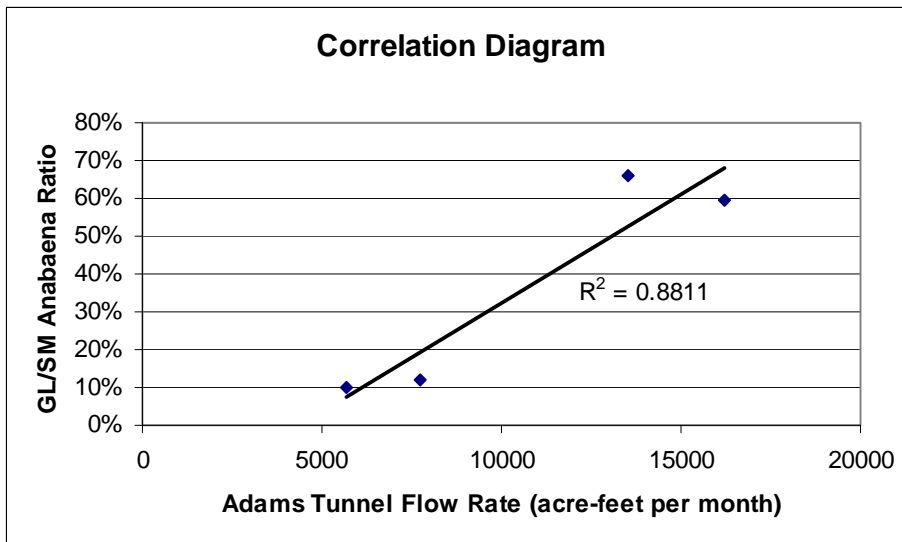
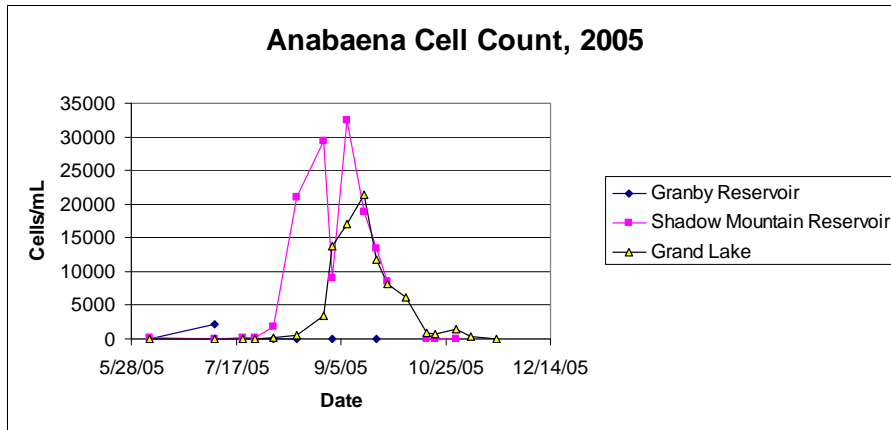
⁷ Michael R. Stevens, Water Quality and Trend Analysis of the Colorado-Big Thompson System Reservoirs and Related Conveyances, 1969 – 2000.

⁸ Three Lakes Clean Lakes Watershed Assessment Draft Report,

2004 Blue-green algae bloom develops in Shadow Mountain Reservoir; algae-laden water pumped into Grand Lake:



2005 Blue-green algae bloom repeats, with greater flow forcing Grand to new highs:



Grand Lake Water Sources



North Inlet under Grand Avenue Bridge (9/05)



East Inlet under Pedestrian Bridge (9/05)



**CBT Reversed Flow through the old headwaters connecting
Grand Lake to Shadow Mountain Reservoir (9/05)**

2006 From NCWCD's May 2006 Water News:



2006 On Grand Lake, embedded weeds are appearing as never seen before:



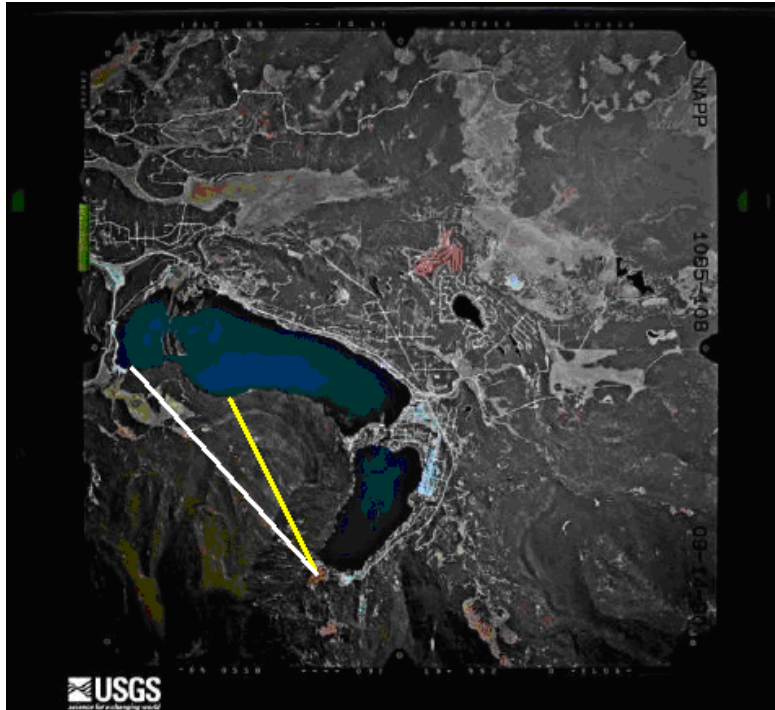
This new weed bed reaches to the surface in 3 feet of water on Grand Lake's southwest shore. In previous years this area was clear of weeds with an oligotrophic lake bottom (rocks, sand and silt).

2007 More studies on water quality proposed by the Bureau of Reclamation⁹:

“The reservoirs in this study may be undergoing increased eutrophication...”

⁹ Lieberman, Davine, Physical Attributes of Five Reservoirs on the Colorado-Big Thompson Project, 2005-2006: Lake Granby, Grand Lake, Shadow Mountain Reservoir, Horsetooth Reservoir, and Carter. Draft Jan 2007.

GGLSA suggests that existing data is compelling, and it is time to move on to evaluation and implementation of less-harmful means of moving water to the Front Range.



McLaughlin Rincon tunnel alternative¹⁰:

One more 3 mile tunnel will alleviate the influx of nutrients into Shadow Mountain Reservoir and Grand Lake by moving water across the deep face of Shadow Mountain dam. Nutrient flow through the shallower areas of the reservoir will be largely limited to the influx from Grand Lake.

C-BT currently has 34.4 miles of tunnels in today's system. The Shadow Mountain tunnel would add less than 10% to the total. The \$60 million cost of the project spread over the 750,000 users of C-BT water amounts to a one-time fee of \$80 per user.

The cost is trivial compared to other projects under evaluation. NCWCD has recently sponsored engineering evaluation of the Yampa River Project¹¹ as summarized in their Table ES-6 on the following page.

¹⁰ Scoping Study, Three Lakes Water Quality, conducted by McLaughlin Rincon with consultation from Makai Ocean Engineering and Lyman-Henn, Inc., 2006

¹¹ Multi-Basin Water Supply Investigation, NCWCD December 2006

NCWCD Yampa River Project Summary

Table ES-6			
Alternative Comparison and Costs (Single Phase)			
	North	Central	South
Storage (AF)	575,000	575,000	575,000
Pipe (miles)	208	210	227
Tunnels (miles)	67	57	46
Pumping (hp)	294,000	297,000	299,000
Hydro (MW)	115	118	117
Capital Cost to N. Colorado	\$3.97 Billion	\$3.82 Billion	\$3.88 Billion
- Unit Cost (\$/AF)	\$11,000 +/- per AF		
Capital Cost to Denver	\$3.87 Billion	\$3.84 Billion	\$3.91 Billion
- Unit Cost (\$/AF)	\$13,000 +/- per AF		
Annual O&M Cost (\$/AF)	\$150+/- per AF		

A \$4 Billion Project!

Summary: Let's fix the Colorado-Big Thompson Project first!

- **Degradation of the waters of Grand Lake is visually evident**
 - Silt, weeds and algae infiltration
 - New embedded weeds along the Grand Lake shoreline
- **Shadow Mountain reservoir is known to be the source of weeds and algae**
 - GCWIN data
 - NCWCD
- **Degradation is expected to accelerate**
 - Hydrosphere study predicts doubling of Phosphorus in ten years
- **Less-harmful affordable means of moving water have been identified**
 - McLaughlin Rincon scoping study

Requested Action:

- **Enforce the anti-degradation statute of the Clean Water Act**
- **Compel NCWCD and the Bureau of Reclamation to plan and implement less-harmful means of moving water to the Front Range**
 - Limit the flow of nutrient-rich water into and through Shadow Mountain reservoir
 - Eliminate the influx into Grand Lake
 - Remain consistent with all requirements of Senate Document 80