# WATER QUALITY/CLARITY IN THE THREE LAKES (GRAND LAKE, SHADOW MTN AND GRANBY) AND TRANS MOUNTAIN DIVERSION


**TOWN OF GRAND LAKE, THREE LAKES WATERSHED ASSOCIATION/ OUTSTANDING GRAND LAKE FOUNDATION**

*STEVE KUDRON*

*MICHAEL CASSIO*

*KIRSTEN HECKENDORF*

*JEFF METZGER*


# *GRAND LAKE IS COLORADO'S LARGEST AND DEEPEST NATURAL LAKE AND A MAJOR PART OF THE HEADWATERS OF THE COLORADO RIVER.*

**(left) Grand Lake crystal clear prior to the Farr Pumps being turned on in July. (right) Turbidity of Shadow Mountain Reservoir dumping into Grand Lake.**

# WHY THE EXISTING CBT WEST SLOPE DESIGN HAS CAUSED ENVIRONMENTAL IMPACT

- **The Natural Flow (W-E) is reversed much of the year dumping shallow reservoir water into a pristine natural lake**
- **Water Clarity in Grand Lake has decreased by almost 20 feet since the CBT System was constructed**
- **Water Quality in Shadow Mountain Reservoir (SMR) and Grand Lake has been slowly eroding for over 60 years**
- **The Grand Lake Fishery was a thriving fishery pre-CBT and is now considered "Poor" by the Colorado Parks and Wildlife**
- **Models have shown the current design to be ineffective in protecting Water Quality and Clarity against Cumulative Impacts**

# PURPOSE AND SCOPE

**Purpose of a study is to create a Comprehensive Report summarizing West Slope Water Quality and Clarity related to Trans Mountain Diversions identifying Environmental and Cumulative Impacts related to the existing CBT Design**

**Scope of a study should be focused on the West Slope - Three Lakes (Grand Lake, SMR, and Granby Reservoir), Willow Creek, Windy Gap and the Colorado River to Windy Gap**

# How does Grand Lake Clarity Compare to other Natural Lakes in Colorado in Clarity from 1990-2010?

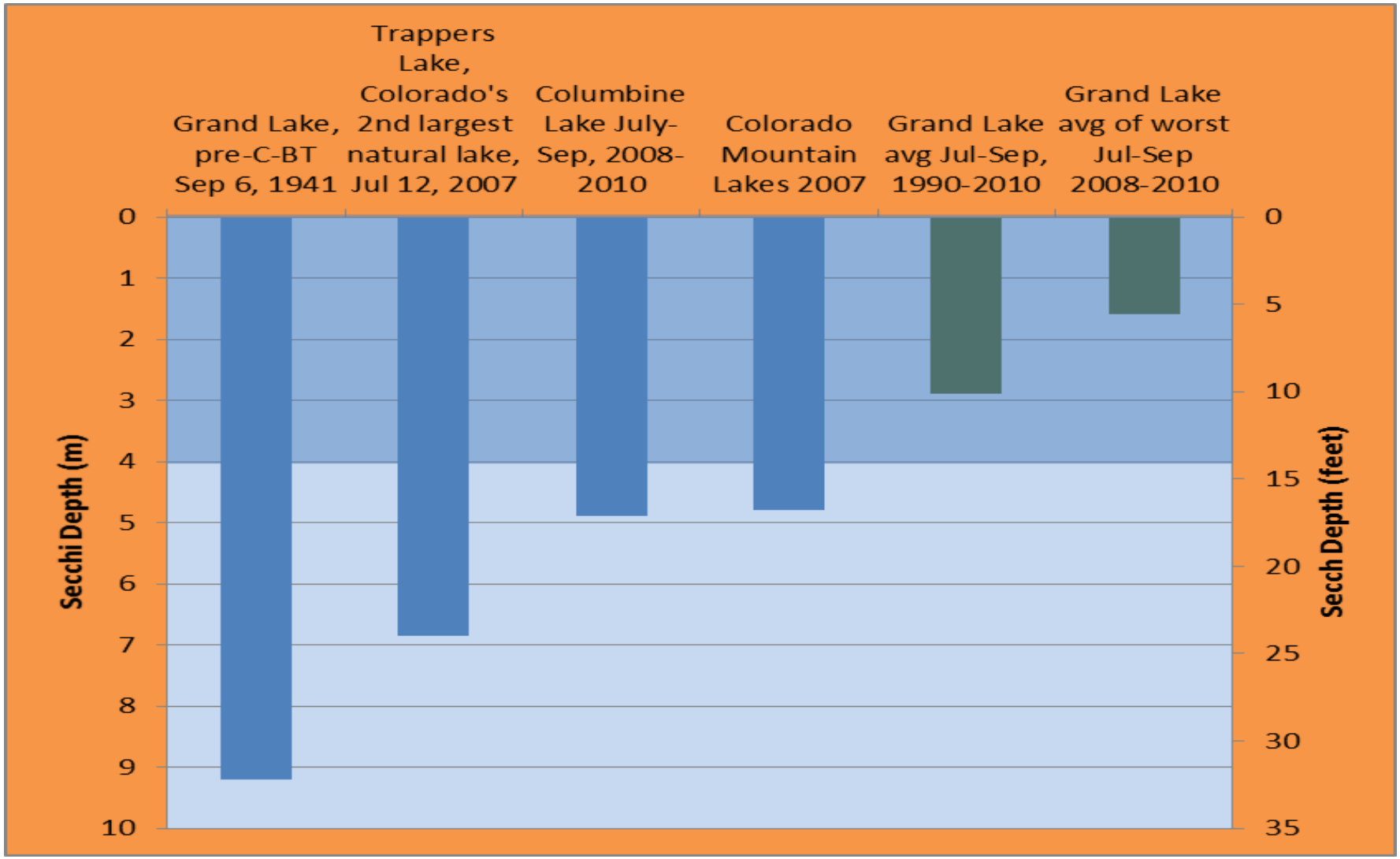

**Table 62. Summary Statistics for Secchi-Depth Measurements for Shadow Mountain Reservoir, 2007 – 2021** (Darker Shading Indicates Higher Values within Each Column)

| | # Observations | Min (m) | Max (m) | Range (m) | Median (m) | Average (m) |
|---|---|---|---|---|---|---|
| 2007 | 20 | 1.2 | 3.1 | 2.0 | 2.1 | 2.0 |
| 2008 | 61 | 1.3 | 3.3 | 1.9 | 2.3 | 2.4 |
| 2009 | 124 | 1.5 | 4.4 | 2.8 | 2.7 | 2.7 |
| 2010 | 96 | 0.8 | 5.6 | 4.9 | 2.4 | 2.5 |
| 2011 | 118 | 1.2 | 4.1 | 2.8 | 2.8 | 2.7 |
| 2012 | 127 | 1.6 | 4.9 | 3.3 | 2.6 | 2.7 |
| 2013 | 136 | 0.8 | 3.9 | 3.1 | 2.2 | 2.1 |
| 2014 | 109 | 1.1 | 5.9 | 4.8 | 2.5 | 2.5 |
| 2015 | 121 | 1.6 | 5.0 | 3.4 | 3.1 | 3.1 |
| 2016 | 170 | 1.6 | 4.9 | 3.3 | 2.8 | 2.8 |
| 2017 | 247 | 1.5 | 4.5 | 3.0 | 2.8 | 2.8 |
| 2018 | 243 | 1.8 | 5.0 | 3.2 | 3.5 | 3.4 |
| 2019 | 162 | 1.9 | 5.1 | 3.3 | 3.6 | 3.4 |
| 2020 | 247 | 1.7 | 4.1 | 2.4 | 2.5 | 2.5 |
| 2021 | 192 | 2.0 | 5.1 | 3.1 | 3.5 | 3.6 |

# MAIN STUDY ELEMENTS

1. ***Sustainability*** **- the quality of not being harmful to the environment or depleting natural resources, and thereby supporting long-term ecological balance**

2. ***Environmental Impact*** **- any change to the environment, whether adverse or beneficial, resulting from a facility's activities, products, or services.**

3. ***Cumulative Impact*** **- result when the effects of an action are added to or interact with others**

# STUDY ELEMENTS OF WATER SUSTAINABILITY

*Three Pillars:*

- **Resilience - the ability to continue important functions indefinitely without a decline in quality.**
- **Efficiency – to generate more value through technology and process changes while reducing resource use and environmental impact throughout the life of system.**
- **Quality – the ability to satisfy requirements that emphasize continuous improvement and innovation with the least environmental impact.**

How is the State of Colorado managing or going to manage and maintain the trans mountain diversions against the natural risk and vulnerability of the 3 Pillars with the current design?

# WHAT IS SUSTAINABILITY AS IT RELATES TO A CBT SYSTEM STUDY?

- Water Sustainability is the availability of fresh water for human consumption and use in agriculture and industrial processes.
- Sustainable water is Colorado being water self-sufficient, managing our water to meet the needs of human, agriculture and industry.
- Study sustainability issues related to CBT and environmental efficiency.

# WHY SHOULD THE WESTERN SLOPE OF THE CBT SYSTEM HAVE A COMPREHENSIVE STUDY CONDUCTED?

1. **The current system still operates on the original 1930's design and supplies water to over 1.1 million front range Colorado residents, irrigates over 600,000 acres of Colorado Ranches and farmland and provides water to over 15 thousand Colorado businesses**.**
2. **When the system was designed the population in Colorado was 1 million and currently the population is 5.8 million** and predicted to reach 8.7 million** by 2050. A study can support the Colorado State Water Plan.**
3. **The entire CBT system is dependent on a 9'9" tunnel (Alva B. Adams) that begins at the east end of Grand Lake and runs 13.1 miles under the Continental Divide to Estes Park.** *(** data from July 2021 US Census Bureau)*


# WHY SHOULD THE WESTERN SLOPE OF THE CBT SYSTEM HAVE A COMPREHENSIVE STUDY CONDUCTED (CONTINUED)?

5. **Between the impact of our population growth (+100,000/year), global warming, and seeing the impact of the extreme drought in the lower Colorado River Watershed, a detailed study will support the need to re-engineer the system to advanced technology and design.**

6. **In September of 1941, prior to the the first C-BT water being delivered to the East Slope (June 23, 1947), a secchi depth reading (without view scope) of 9.2 meters (30 feet) was recorded at Grand Lake. Today, the average is below 4M (13').**

*The 1941 secchi reading of 9.2M (30') was taken without a views cope and all current readings are taken with a view scope which means the secchi depth could have been closer to 12-15M because it allows monitoring without interference from refracted light and solar glare.*

# Why should the Western Slope of the CBT System have a Comprehensive Study Conducted (continued)

6. Since the depth in SMR only averages 13', during July and August the temperature of the water warms to a level that grows extreme weeds and algae. The weed/algae issues cause major problems to the fishery, water quality and clarity and greatly impacts the recreation in SMR.

7. The current design reverses the natural flow of water most of the year causing algae and weeds from SMR to flow into Grand Lake, disrupting water quality and clarity issues and impacting recreation and commerce.



# WHY SHOULD THE WESTERN SLOPE OF THE CBT SYSTEM HAVE A COMPREHENSIVE STUDY CONDUCTED (CONTINUED)?

8. The intake for the Alva B. Adams Tunnel is unprotected and has zero security with the exception of one basic camera. The whole system could be poisoned within minutes with no detection.

9. The CBT system relies on old pumping technology to move water from Windy Gap and Willow Creek into Granby and from the Farr Pumping Plant into the pump canal. The pumps can only be on or off and should be upgraded.

10. The current CBT design has large amounts of sediment releasing into an already shallow reservoir (SMR) and also onto the shelf on the west end of Grand Lake where the connecting channel enters, thus reducing capacity and causing recreational issues on both bodies of water.

# A study Would Need to Evaluate the Current West Slope Design Considering these Points

- Water quality (including clarity) data and overview of past and current studies completed by the Federal Government, State of Colorado, Northern Water, Grand County, Colorado River Conservation District, NWCCOG, universities, and consultants
- Overall current impacts to ecology (ecosystem, population, landscape, community, organismal, and global) and environment as a whole
- Description of all unintended consequences of the 1930 CBT design identified to date
- Evaluate the health of the fisheries for Grand Lake, SMR, Granby, Willow Creek Reservoirs and Colorado River between SMR and Windy Gap, and potential costs to improve all to "thriving fisheries".
- Description of the entire CBT - maps, diagrams, lakes, reservoirs, tunnels, canals, diversions, pumps, flow diagrams, water quantities, total users (residents, businesses and irrigation) with a focus on the Western Slope System
- Potential homeland security threats and security issues with intakes, outfalls, diversions, vents, plans, and penstocks for system shutdowns

# PROPOSED BILL

"CONDUCT A DETAILED STUDY TO EVALUATE THE SUSTAINABILITY, ENVIRONMENTAL AND CUMULATIVE IMPACT THE CBT SYSTEM HAS ON THE UPPER COLORADO RIVER WATERSHED'S WATER QUALITY, CLARITY, ECOLOGY, AND SECURITY BASED ON THE CURRENT DESIGN."

# POINTS OF CONTACT


**Michael Cassio**

President, TLWA

(303) 717-0379

michael.cassio@msn.com

**Jeff Metzger**

Director, TLWA

(303) 898-9190

jrmetzger36@gmail.com

**Kirsten Heckendorf**

Director, TLWA and Outstanding Grand Lake Foundation

(303) 378-7507

kirsy573@msn.com

**Steve Kudron**

Mayor, Grand Lake

(303) 408-0448

steve@toglco.com