



Keystone  
Science School

# H2O OUTDOORS 2022 FINAL REPORT

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“My daughter absolutely loved it. From the team building skills to the hands on projects, she felt included, heard and a great sense of comradery.”

*-2022 H2O Outdoors parent*

# OVERVIEW

H2O Outdoors is a standards-based, educational program hosted at Keystone Science School and available to all Colorado high school students. Over the course of three days, students participate in a stream survey, expert panel, and town hall meeting to gain a broad understanding of the human and environmental complexities of water management in Colorado and, on a wider scale, the western United States.

## DURING THE PROGRAM, STUDENTS:

Learned about Colorado's important role as the headwaters state for a large portion of the Colorado River Basin.

Gained an understanding of water rights issues ranging from prior appropriation laws to the Colorado River Compact.

Conducted a stream survey, met experts from industries with stakeholder roles in the water management process, and participated in a town hall meeting to address a scenario designed around realistic water management questions.



H2O Outdoors is made possible through generous funding provided by **Denver Water** and **Aurora Water**.



# PROGRAM GOALS

1. Explain the concept of a watershed and identify major watersheds in the US, Colorado, and Summit County.
2. Understand water supply and demand issues in Colorado and the Colorado River Watershed.
3. Explain Prior Appropriation and the nature of a Water Right in Colorado.
4. Recognize the importance of limited freshwater resources.
5. Analyze and interpret the perspectives of real-life stakeholders in Colorado water management through the lens of sustainability.
6. Practice 'solutions-oriented' collaborative approaches to managing Colorado's water resources.
7. Collect field data relevant to water quantity and quality.



“This sparked a lot of interesting conversation with us and helped our teen think more critically. It also opened his eyes to our connection with water.”

-2022 H2O  
Outdoors parent

## Tuesday: Training day

Prior to the beginning of the program, Denver Water and Aurora Water education team staff spent a day with Keystone Science School instructors to get to know one another, ensure content unity, and learn from each other.

- Colorado Water Rights, 80/20 rule with new maps, Watershed boundaries vs. political boundaries
- Lunch with teachers participating in the Beyond the Classroom program, instructors, and partners.
- Discussion on water management strategies, deep dive into transmountain diversion and other topics that came up throughout the day. Planning for Expert panel, Town Hall meeting, and Tips and tricks for how to make this program a success.

## Wednesday, October 26th

- Students arrive and program introduction, present Town Hall prompt & stakeholder roles
- Break into field groups, meet and greet & gear check, stakeholder assignments & team building
- Build a watershed - basic introduction to the Continental Divide, which way water flows
- Drop in a bucket - Water World
- Where are the people, Where is the Water? 80/20
- Watershed boundaries compared to political boundaries maps
- Write questions for expert panel in journal
- **Expert panel**
- Evening Program: Stakeholder Development & poster making

# PROGRAM SCHEDULE

## Thursday, October 27th

- Prior Appropriation at breakfast

### FIELD DAY IN FIELD GROUPS

- Plumbing the Colorado
- Discuss point/non-point source pollution → chemical survey
- **Stream Survey** - chemical, physical, biological
- Management Strategies Pros/Cons Analysis
- Loveland Pass—revisit watersheds, connect watersheds
- Prepare & Present Aquatic Survey Presentations
- Pulse Flow video to offer hope after plumbing the CO
- Evening Program: Meet and Greet (poster presentation), Town Hall Preparation Time

## Friday, October 28th

### Town Hall Meeting

- In Stakeholder groups students create policy recommendations for Colorado water management and discuss them with all other stakeholders to come up with collaborative recommendations.

# DAY 1: EXPERT PANEL & WATERSHEDS

## EXPERT PANEL

The expert panel is an opportunity for students to learn about issues within water quality and quantity directly from professionals working in the field of water management. The Panel provides students with a baseline of water management knowledge while exposing them to careers within the world of water.



## TOUR OF CONTINENTAL DIVIDE & WATERSHED EXPLORATION

To gain a sense of scale surrounding western water issues, students visited the Continental Divide to discuss human impacts on watersheds, including pollution and trans-mountain diversions, and the distribution of water in Colorado relative to its population.

## PANELISTS

**Troy Wineland**

- Summit County Water  
Commissioner

**Eric Detmer**

- Chief Environmental Engineer

**Matt Bond**

**Melissa Botteicher**

- Denver Water

**Mary Dawson**

**Sherry Meschko**

- Aurora Water

**Kendra Fuller**

- Blue River Watershed Group

**Ian McCluskie**

**Kyle Salz**

- Keystone Science School

# DAY 2: STREAM SURVEY

On day 2 students went into the field to conduct a stream survey and tested the health of the Blue River Watershed. Four groups of students traveled to different locations across the watershed to collect data before sharing their data with each. Following an analysis of the data, students made their own inferences of the general health of the watershed.



## WHAT TESTS WERE COMPLETED?

### *Physical Water Test*

1. Stream discharge (CFS calculations)
2. Stream Area
3. Resistance Constant
4. Surface Velocity

### *Aquatic Biology Survey*

1. Monitoring Aquatic Macro-invertebrates

### *Chemical Water Quality Test*

1. Temperature
2. pH
3. Dissolved Oxygen
4. Copper
5. Phosphates
6. Iron
7. Nitrates

## WHERE DID GROUPS GO FOR THE TESTING?

Upper Blue River, Lower Blue River, Snake River, & North Ten Mile Creek

# DAY 3: TOWN HALL

The town hall is the culminating activity with students focused on collaboration and consensus building. Through the lens of their assigned stakeholder roles, students worked to generate policy recommendations within the given prompt.

## Prompt

The population of the Front Range is predicted to increase from 5.8 million in 2021 to 7.8 million by 2040. In preparation for this population boom, there has been a proposal for a new reservoir on the East side of the Continental Divide that is filled through a trans-mountain diversion with water from the Western Slope. The reservoir would provide water storage and recreation for many stakeholders.

**Does your stakeholder support this proposal?**

**Why or why not?**

**If yes, under what conditions?**

**If not, what is an alternative solution?**

## Stakeholders

Colorado River District

Climax Molybdenum Mine

Colorado Water Conservation Board (CWCB)

Trout Unlimited

Colorado Farm Bureau

Oil and Gas Exploration Company

Front Range Water

Outdoor Recreation & Tourism

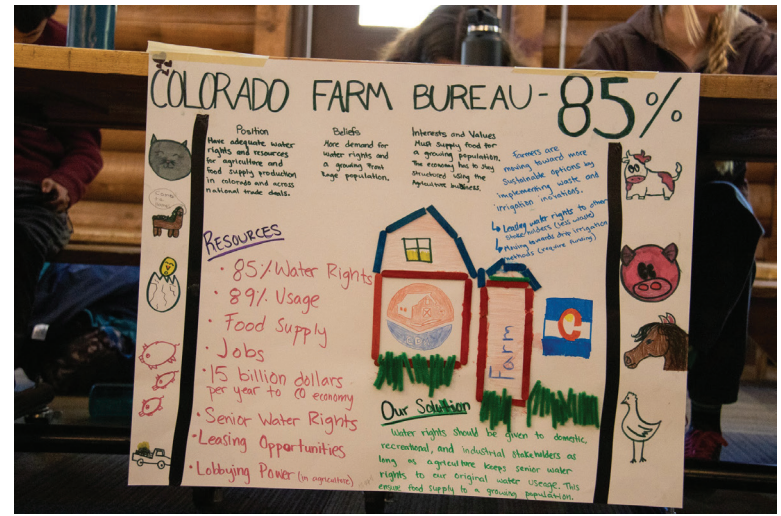




# PROCEDURE FOR TOWN HALL MEETING

The Town Hall met in Rives as one large group, facilitated by instructors. Partners and mentors were there to help answer questions as they come up.

1. Each stakeholder states who they are, why they value water, and their position on this issue
2. Open debate for 10-15 minutes
3. Mingling Time for 15 minutes - stakeholders can meet and discuss specific solutions
4. Open debate for 10-15 minutes - solution focused
5. Agree on solutions and wrap up



## RESULTS/POLICY RECOMMENDATIONS RESULTING FROM THE TOWN HALL MEETING

- Funding for drip irrigation for farming by certain stakeholders
- Working together on scheduling water release/flow
- Trade water rights between stakeholders
- Discounts on non-potable water for stakeholders that can use it
- Leasing land between farmer, oil and gas
- Leasing Water to Trout Unlimited

# BY THE NUMBERS

## STUDENT HIGH SCHOOLS

Abraham Lincoln High school  
Anderson Williams  
Cherokee Trail High School  
Eaglecrest High School

Jefferson County Open School  
Littleton High School  
Middle Park High School  
Niwot High School

Overland High School  
The Peak School  
Steamboat Springs  
High School  
Vista Peak Preparatory

**33**  
STUDENTS

**4**  
FIELD GROUPS

**29**  
CONTACT HOURS

## STUDENT HOMETOWN WITHIN COLORADO

DENVER  
WHEATRIDGE  
CENTENNIAL  
LITTLETON  
AURORA

BRECKENRIDGE  
WESTMINSTER  
ARVADA  
EAGLE  
STEAMBOAT SPRINGS

GOLDEN  
NIWOT  
TABERNASH  
LAKEWOOD

“It helped her understand what her place is in Colorado Water Policy... a deeper appreciation for the western watershed.”

*-2022 H2O Outdoors parent*



# EVALUATION RESULTS

## LIST OF SURVEY QUESTIONS

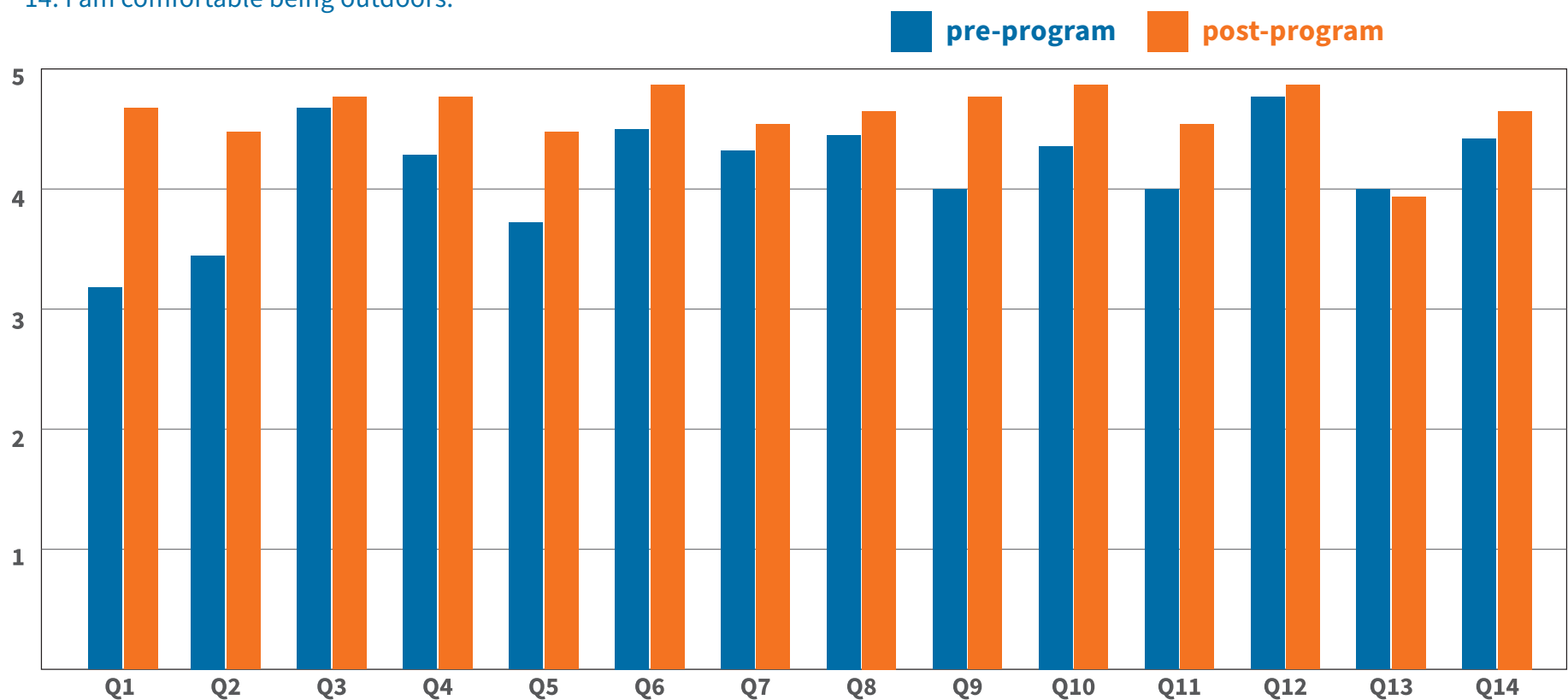
1. I am knowledgeable about water issues in Colorado.
2. Water issues affect my daily life.
3. It is important to understand the issues surrounding water policy and management.
4. Water is a limited resource.
5. I understand where my water comes from.
6. Human actions, deliberate or not, alter ecosystems.
7. The history of water policy is important in understanding current water issues in Colorado.
8. Water policy and management affect people in Colorado.
9. Stakeholders impact decision making for water policy and management in Colorado.
10. Collaboration is important in determining water policy and management.
11. Collaboration can occur when opinions differ.
12. Scientific data can be used to back up arguments.
13. I have the desire to get involved in water use issues.
14. I am comfortable being outdoors.

At the outset of the program and following the conclusion of the town hall, students took pre- and post-surveys. The survey used open-ended questions and Likert scales to evaluate student understanding and learning.

### Likert Scale

#### Response Fields

- 1 = Strongly Disagree
- 2 = Disagree
- 3 = Neutral
- 4 = Agree
- 5 = Strongly Agree





## What was the most impactful/best part of this program?

“I enjoyed the hands on part where we went and tested the Snake River chemically, physically, and biologically.”

“It shows me the real world aspect of water, not just my tap water or shower.”

“Meeting the people who know and work hands on with the water almost everyone in Colorado receives.”

“The most impactful part was learning about the water we gain and lack as well as learn from other stakeholders opinions.”



## What is one new thing you learned while you were at H2O Outdoors?

“I learned how much time, thought, and money goes into water management.”

“I learned how reservoirs work, why they’re helpful, and why they’re harmful.”

“That I actually want to pursue this as a career option.”

“I learned that the Roberts Tunnel takes water from Dillon Reservoir and brings it over to the east.”



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Science School

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**THANK YOU!**

**SEE YOU AT THE NEXT H2O OUTDOORS OCTOBER 25-27, 2023**

U.S. DEPARTMENT OF AGRICULTURE

