Project F.L.O.W.

Future Leaders Observing Watersheds

Presented by:
Amy & Dan Riddle

So, It all Started With a Totally Normal Conversation...

Amy:
“So... would it be useful if more water quality data was collected along the Carson river?”
Dan:
“Yes, it would.”
Amy:
“Can anyone collect water quality data?”
Dan:
“Yes, they can.”
Amy:
“Could I collect water quality data?”
Dan:
“...Technically, yes.”
Amy:
“Could the Green Biz Kidz collect water quality data?”
Dan:
“Yes...”
Amy:
“Interesting...”

Then Came the Tiny Follow-Up Question…

Amy:
"So what would would be needed to actually do this?"

Dan:
"Well, you would need…"

1

Equipment

Sensors, loggers, calibration tools

2

Money

Because science is not free

3

Motivated Staff

People willing to learn and maintain equipment

4

Leadership

Someone to say, "Yes, but safely."

5

Expertise

So the data actually means something

Amy:
"So… not impossible?"

Dan:
"No. Just entailing."

Amy:
"Perfect. My favorite kind of project."

We Realized We Might Actually Be Able to Do This

We started looking at what a basic water quality monitoring program would need.

Luckily, Dan works in the field of water quality monitoring and data analysis, so he was able to help identify the equipment and technical pieces needed to get started.

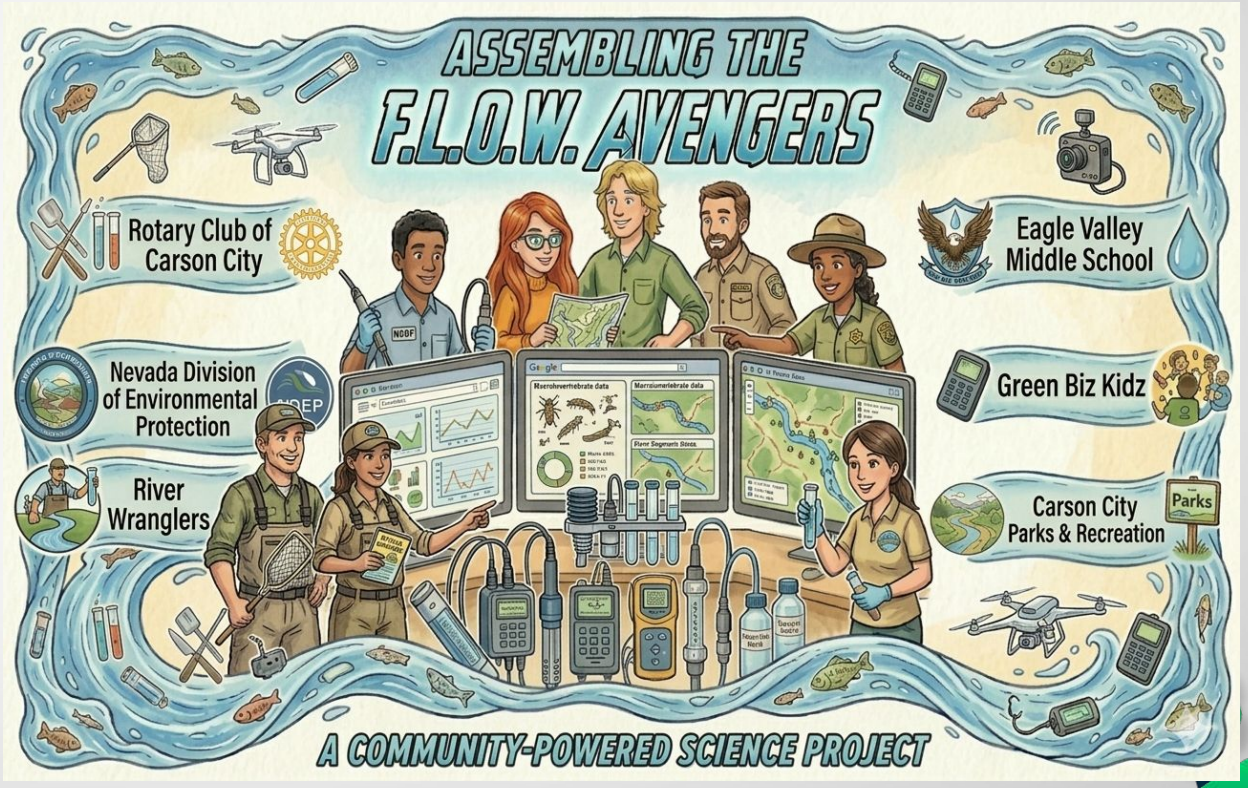
Estimated cost: About **$5,000**

Around the same time, the Rotary Club had a grant opportunity available for — conveniently — $5,000.

Assembling the F.L.O.W. Avengers

The Rotary grant emphasized the importance of community partnerships.

So we reached out to people who care about students, science, rivers, and community stewardship.



Basically, we needed to start assembling the watershed version of the Avengers.

The Partners Who Said Yes

The River Wranglers

We reached out to River Wranglers and shared the idea:

What if students could help collect real water quality data from the Carson River?

What if this could connect to watershed education across multiple grade levels?

What if students were not just learning about science, but actually doing science?

River Wranglers' response:
"Absolutely. We would love to support a project like that."

Amy's internal response:
"Great. This idea has officially escaped my brain and entered reality."

NDEP

Dan reached out to the Nevada Division of Environmental Protection to ask if they could support the technical side of the project.

We needed help with:

Equipment setup
Calibration
Deployment
Water quality monitoring protocols
Understanding data quality
Connecting student work to real-world science careers

NDEP's response:
Yes, they would be willing to support the project.

At this point, the project had adult supervision, which is always reassuring.

EVMS- Ms. Hoppe

But before moving forward, we needed to ask our principal, Ms. Hoppe, if Eagle Valley Middle School could support this big idea.

Amy:
"So... this might sound a little far-fetched..."

Ms. Hoppe:
"Tell me more."

We shared the vision: students collecting real water quality data, building scientific literacy, connecting to the Carson River, and creating a model for student-led citizen science.

With her blessing and consent, we were able to keep moving forward.

Parks and Recreation

We had already been working with Carson City Parks & Rec on several other awesome projects, so naturally...

Amy forgot to tell them about Project F.L.O.W. until about a week before launch.

Amy:
"Hi! So... We're deploying water quality equipment in the river next week, wanna join?

Parks & Rec:
"Of course we'll go with you guys."

Amy:
"Phew!"

Thanks to their continued support, we one more great community partnership.

Then We Got the Grant

After all the brainstorming, partner conversations, equipment planning, and principal approval, we submitted the Rotary grant application.

And then…

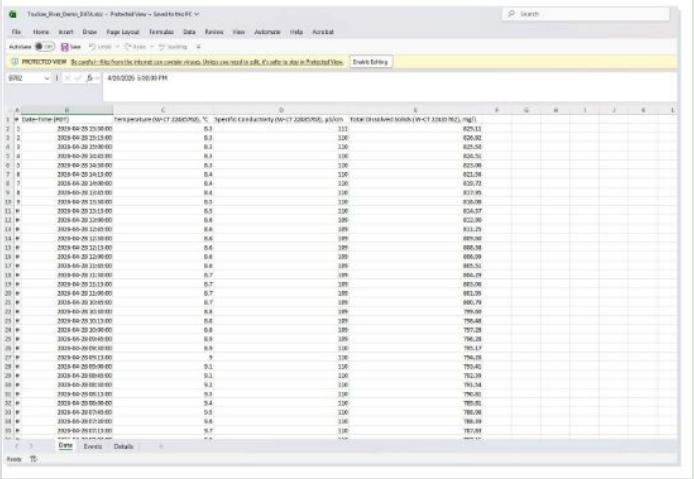
Then we got it.

The Rotary Club awarded Project F.L.O.W. the funding we needed to purchase the water quality monitoring equipment and officially launch the project.

This was the moment Project F.L.O.W. moved from:
"Wouldn't this be cool?"
to
"Oh wow. We actually have to do this now."

Reality: The Data Problem

Amy:
"So… this is what the data we're going to be collecting will look like?



Dan:
"Yes."

Amy:
"And how am I and my students supposed to understand this?"

Collecting data is one challenge.

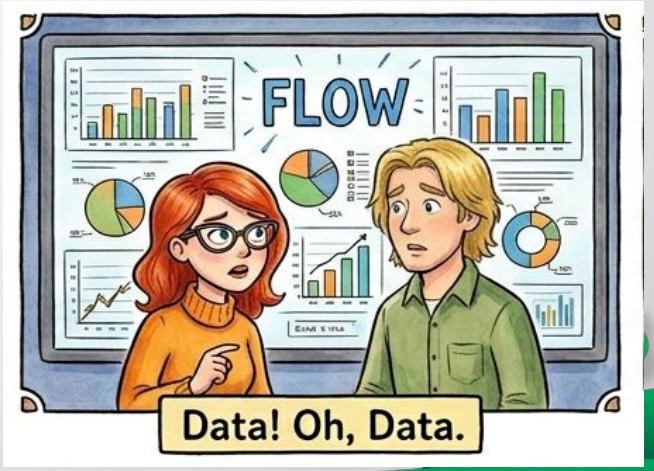
Understanding data is another.

Most raw environmental data looks like this:

- Giant spreadsheets
- Rows and rows of numbers
- Timestamps
- Missing values
- Weird spikes
- More numbers

= Possibly mild panic

This is when Dan realized he was going to have to teach his wife and her 6th graders how to understand the complexities of hydrologic data.



Data Tells a Story

Raw data is important, but it is not always easy for students, teachers, community members, or nonprofits to interpret.

A spreadsheet might technically contain the answer, but it does not always help people understand:

- What changed?
- When did it change?
- Why might it have changed?
- Is this normal?
- Is something missing?
- What should we pay attention to?

Agreement: Data should not require a decoder ring, three coffees, and a minor emotional breakdown.

Amy: “So what are we (you…) going to do to make the data we’re collecting understandable for us?”

He started building the Project F.L.O.W. Platform, and just like that, Dan became an honorary member of the Green Biz Kidz and was involuntarily employed for life!

Dan Started Building the Missing Piece

Dan began developing a platform that takes complicated water quality data and turns it into something people can actually use.

The goal is to make data more:

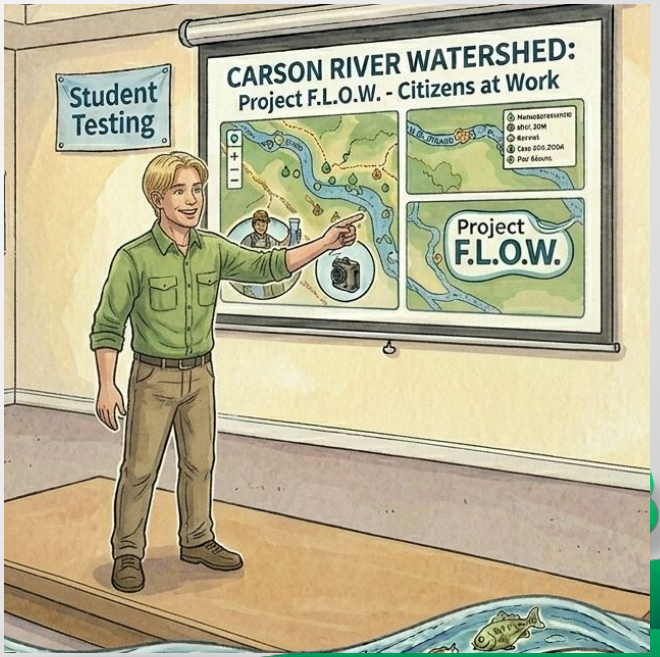
- Visual
- Understandable
- Interactive
- Educational
- Useful for students, teachers, nonprofits, and community partners

Instead of just showing raw numbers, the platform helps people see patterns, changes, gaps, and possible explanations

Amy:
"So you made the data less scary?"

Dan:
"That was the goal."

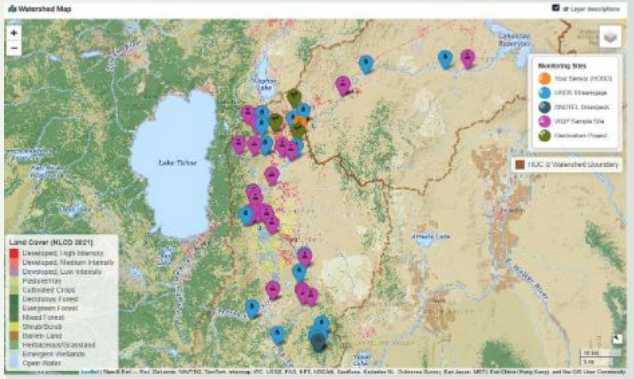
Amy:
"Excellent. Because middle schoolers can smell fear."

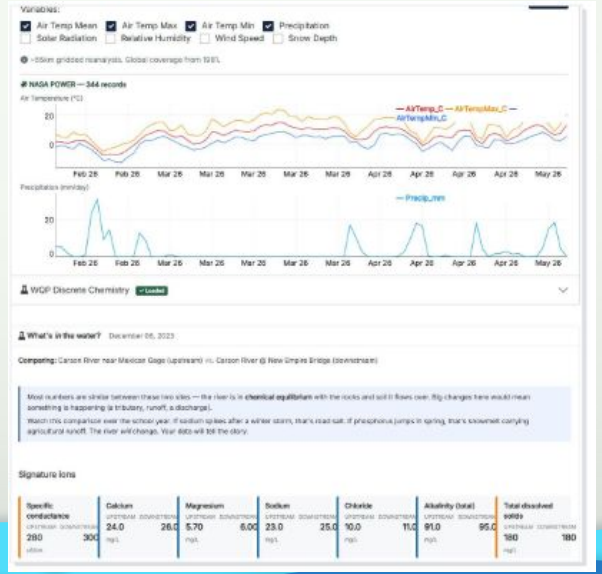


From Sensor File to Story

The STEPS

1. **Upload the sensor data**
   The equipment collects the numbers.
2. **Place it on the map**
   Now we know where the data came from.
3. **Compare it to other information**
   Weather, streamflow, chemistry, and past records help explain what we are seeing.
4. **Turn it into a student-friendly story**
   Now students can ask, “What happened here?” instead of “Why are there 40,000 rows?”



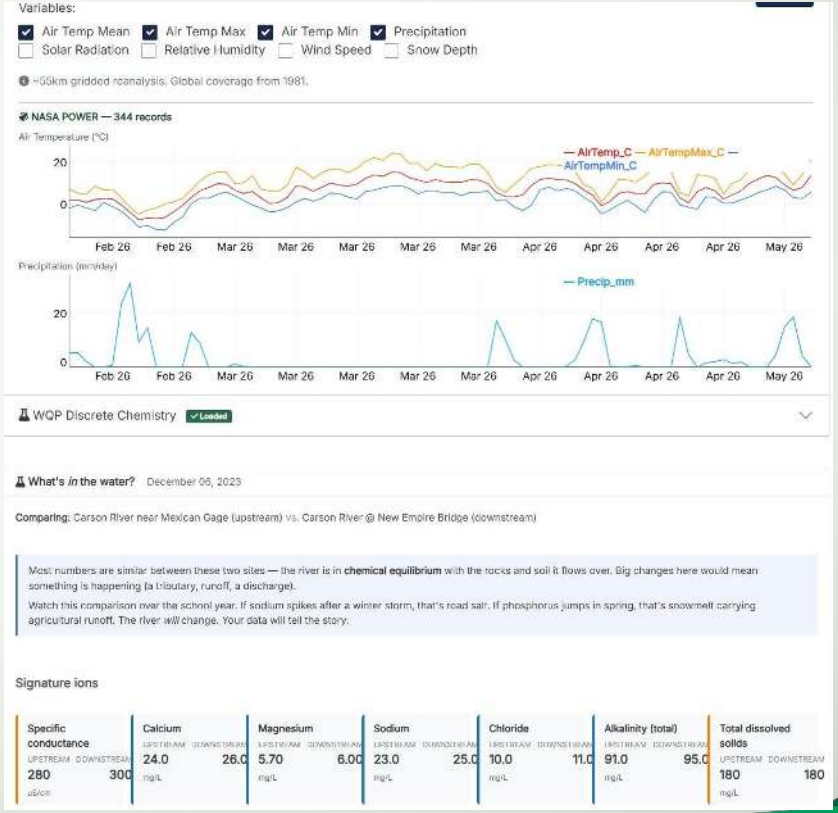


The Platform Connects Data to Context

When something changes in the river, we need clues to understand why.

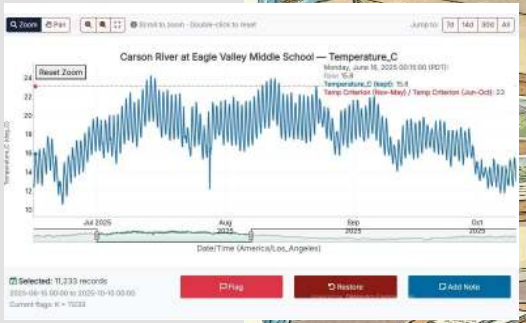
The platform can help compare water quality data with:

- **Weather:** Was it hot, cold, rainy, snowy, or dry?
- **Streamflow:** Was the river running high or low?
- **Chemistry:** What is normally in this part of the river?
- **Location:** Is this happening upstream, downstream, or only at one site?
- **Time:** Is this normal for the season, or something unusual?



Not Every Data Point Is Innocent

Before data can be trusted, it needs to be reviewed.



Sometimes data has problems:

- A sensor gets damaged.
- A sensor gets covered in algae.
- A reading looks strange.
- A file has missing data.
- A spike might be real — or it might be equipment weirdness.

The platform lets users:

- Look closely at the data
- Flag questionable readings
- Add notes
- Keep a record of changes
- Explain why something was marked

Amy:
"So if the graph does something weird, we don't just panic?"

Dan:
"No. We investigate."

Amy:
"Great. Panic later, investigate first."

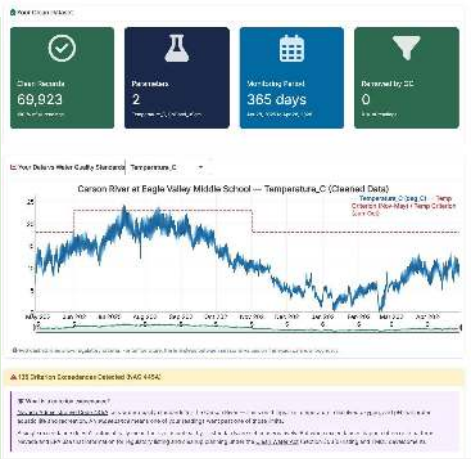
How Do We Know What the Data Means?

A number by itself does not tell the whole story.

For example, if the water temperature changes, students need to know:

- What is normal for this season?
- What level matters for aquatic life?
- Is this a short-term change or a pattern?
- Does it cross a guideline or standard?

The platform can show students when data crosses important thresholds, then explain what that means.



Amy:
"So the platform helps students understand when a number deserves attention?"

Dan:
"Yes."

Amy:
"Like a science version of a check-engine light?"

Dan:
"Exactly."

Amy:
"I get it!"

The Platform Helps Students Think Like Scientists

The platform does not just show students a graph.

It helps them notice patterns, ask questions, and investigate what might have caused a change.

While they explore the data, Edustreams pop up “scaffolds” on the right and explain the concepts and tie directly into curriculum and build environmental literacy.

The F.L.O.W. Platform: Data that Makes Sense

The Project F.L.O.W. Platform is not just about collecting water samples.

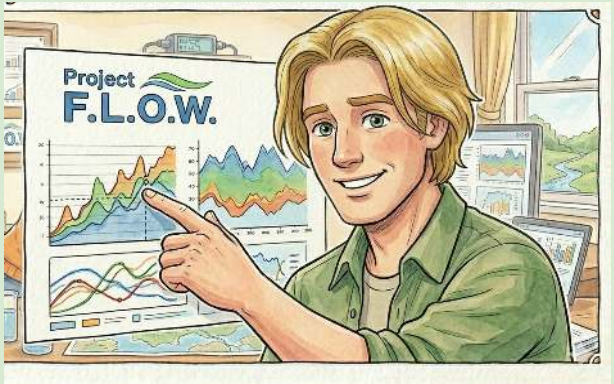
It is about helping students understand that **data is a communication tool.**

Project F.L.O.W Platform Application

Data helps us listen to what the environment is telling us, and we needed a web application that would accomplish this.

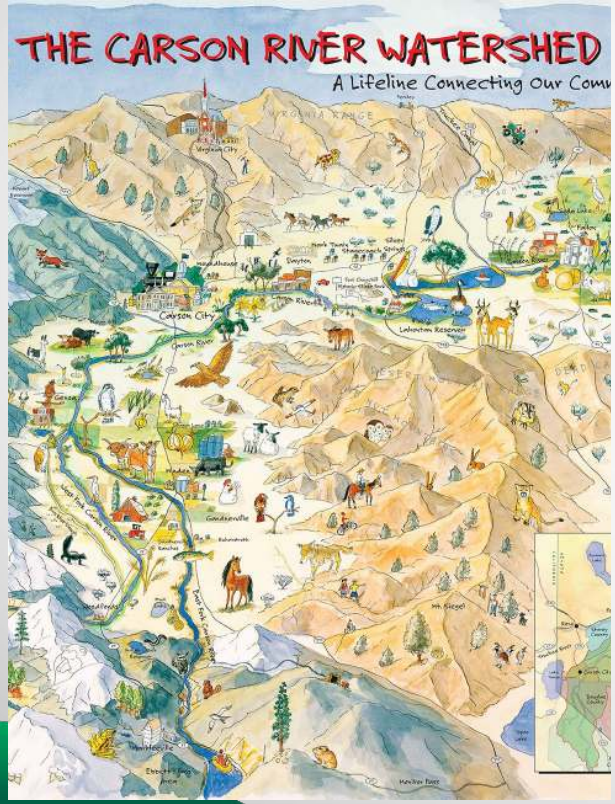
We needed this platform to help students learn:

- What are components of a watershed
- How water quality is measured
- Why long-term data matters
- How scientists use evidence
- How communities make informed decisions



Basically, we (Dan) turned “spreadsheet panic” into “Ohhh, I see what’s happening.”

Why This Matters for the Carson River



Collecting and learning about data helps us listen to our watershed. It is not just where we live, but it is part of our learning landscape.

These scientific investigatory tools will help students learn about:

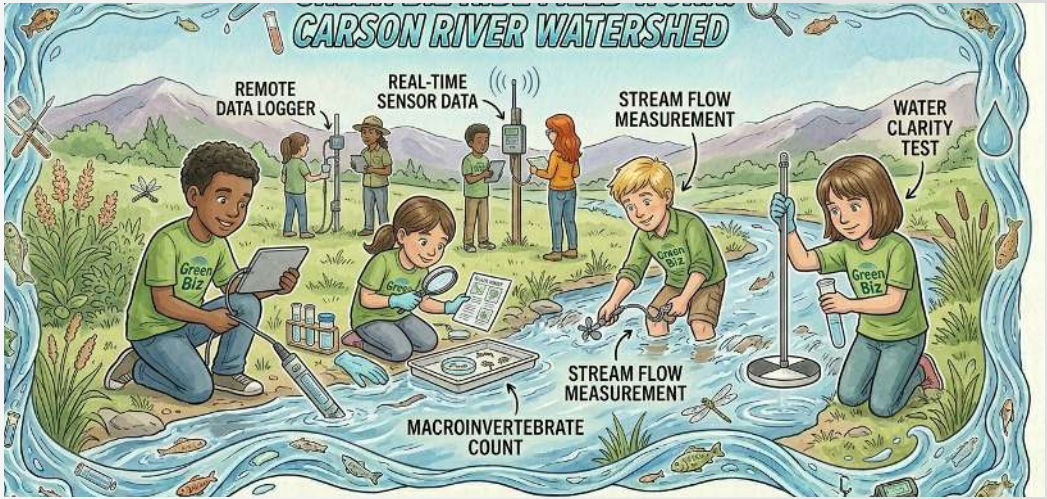
- Their local watershed
- Water quality trends
- Human impacts
- Seasonal changes
- Storm events
- Temperature shifts
- Habitat conditions
- Community stewardship

Growing the Program at EVMS

The next step is to grow Project F.L.O.W. across Eagle Valley Middle School.

We plan to create and connect the project to curriculum for:

- 6th grade science- watershed components
- 7th grade science- biology factors
- 8th grade science- chemistry connections
- Green Biz Kidz- outdoor education and environmental stewardship

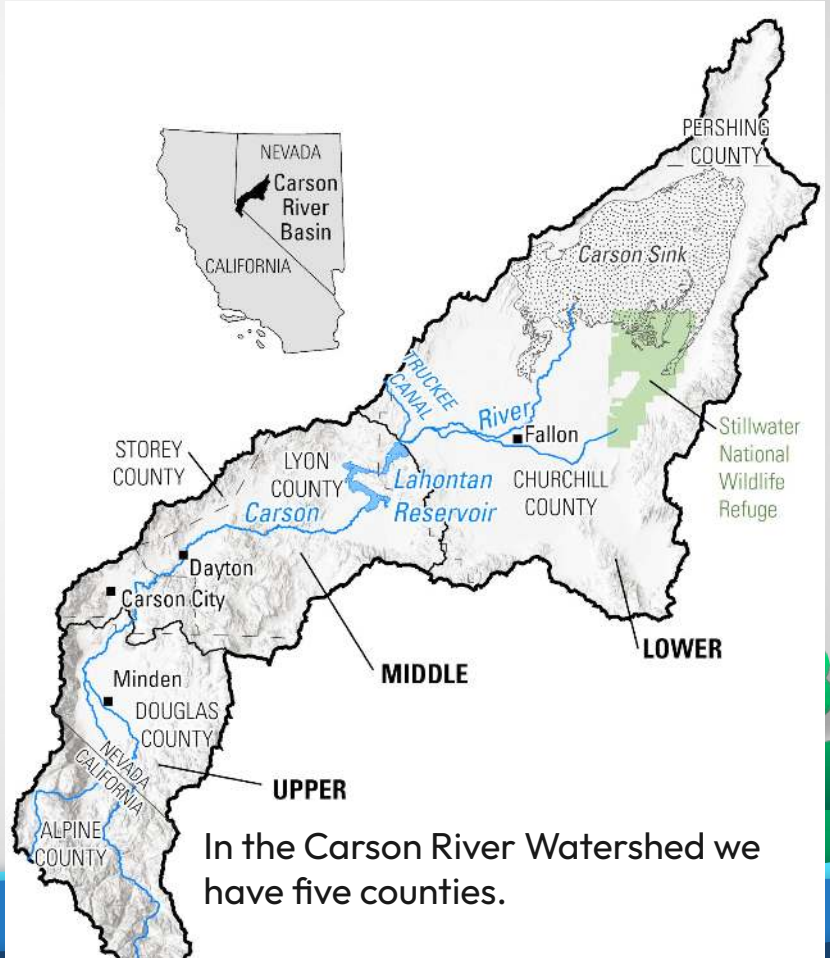


Each grade level can connect to the river in a different way, while contributing to one shared understanding of the watershed.

The Watershed Vision

Now imagine this beyond one school.

- **What if** students across the Carson River watershed were collecting local water quality data?
- **What if** schools, nonprofits, agencies, and community partners all helped **students** monitor nearby waterways?
- **What if** students could compare data across:
  - Different schools
  - Different sites
  - Different counties
  - Different seasons
  - Different parts of the watershed



The Bigger Possibility

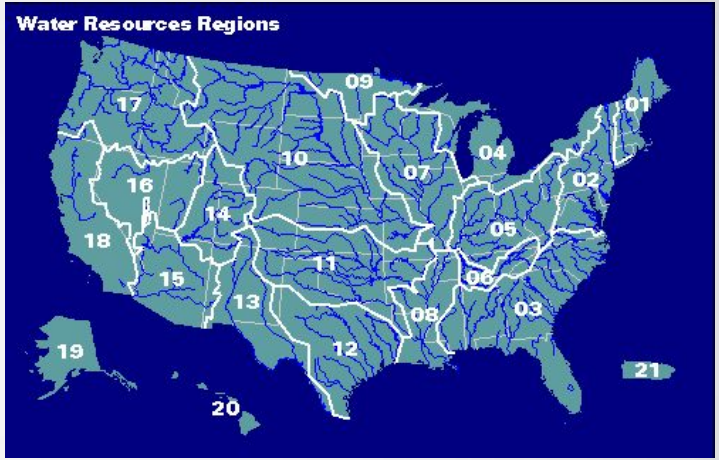
Watersheds exist everywhere.

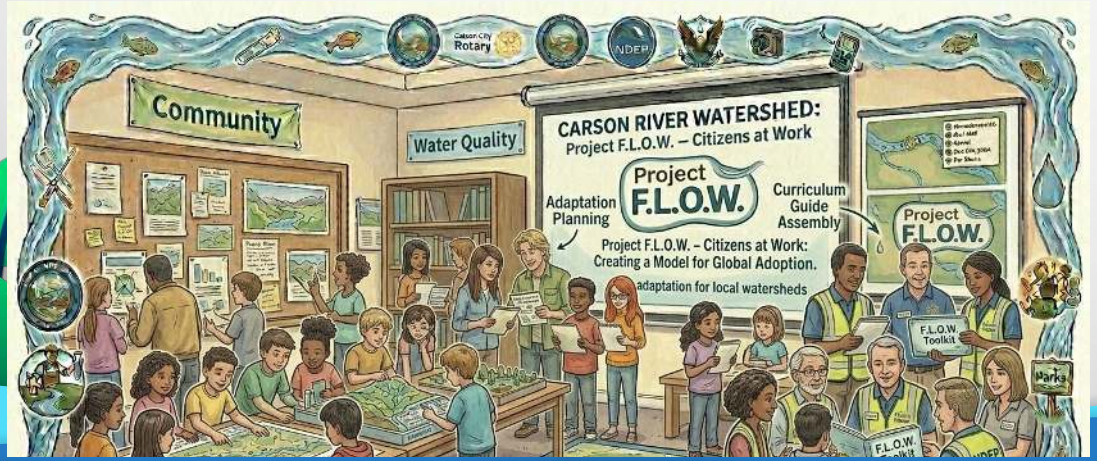
Rotary clubs exist everywhere.

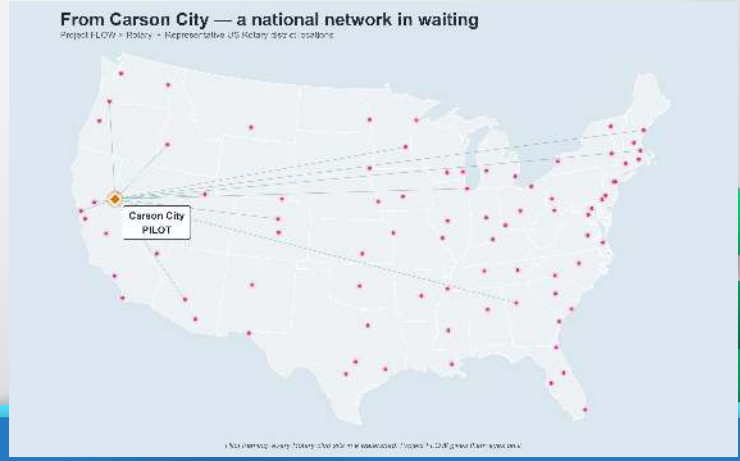
Students exist everywhere.

And the need for environmental literacy exists everywhere.

Project F.L.O.W. could become a model that other schools, clubs, and communities adapt for their own local watersheds.

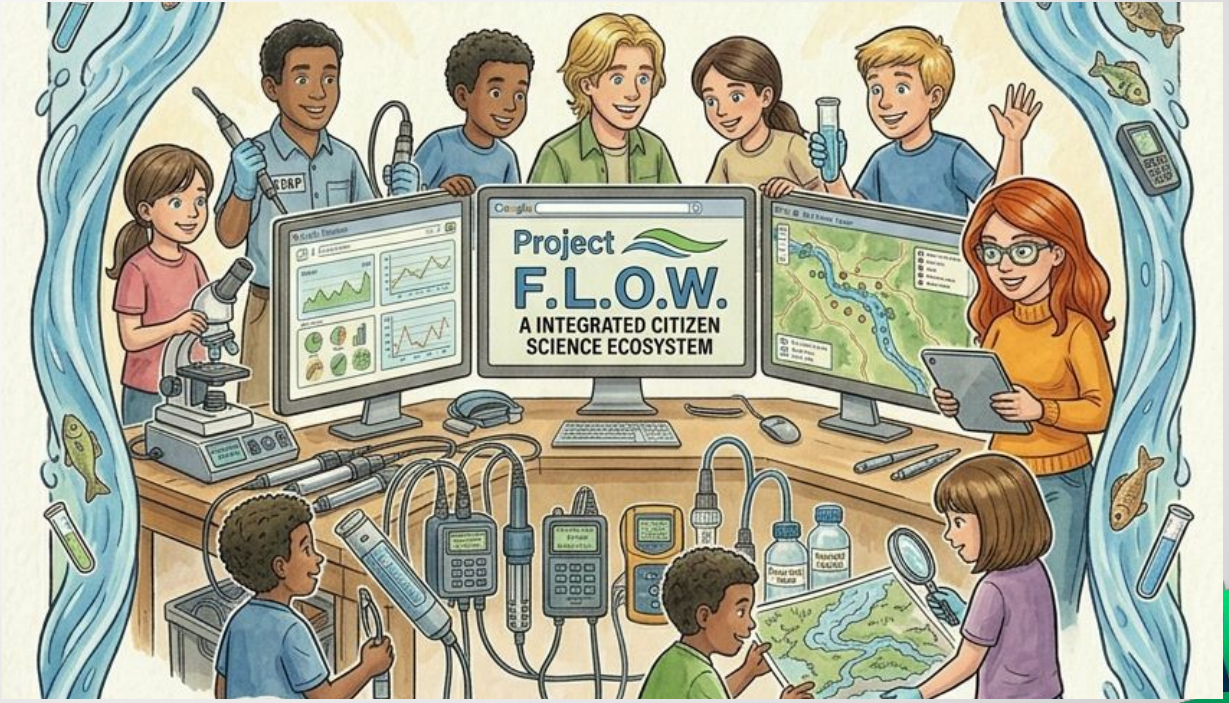






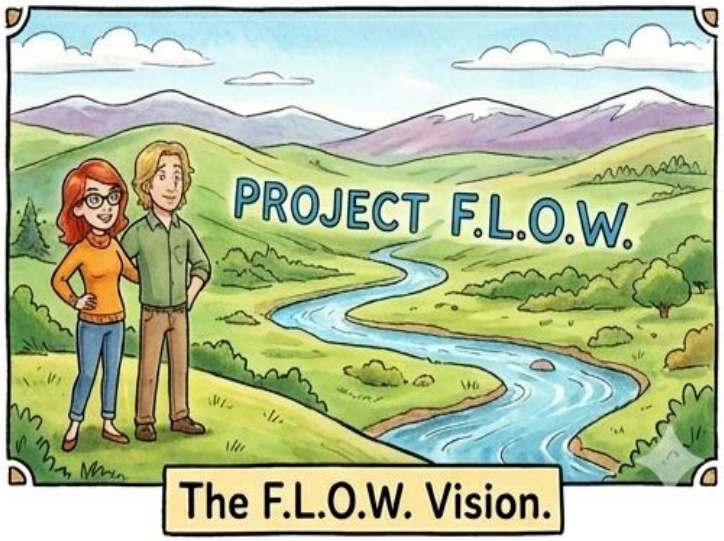
What Project F.L.O.W. Builds

- Student-led citizen science
- Real water quality monitoring
- Community partnerships
- Environmental education
- Data visualization
- Watershed stewardship
- Scientific literacy
- Career connections
- Future environmental leaders



From One Conversation to a Watershed Movement

From one conversation…
to one school…
to one river…
to one watershed…
to a model that could grow far beyond us.



Because the future of watershed stewardship might just start with a middle schooler, a sensor, and someone crazy enough to ask,

"Wait… can **we** do this?"

Thank You for Helping Us Go With the F.L.O.W.

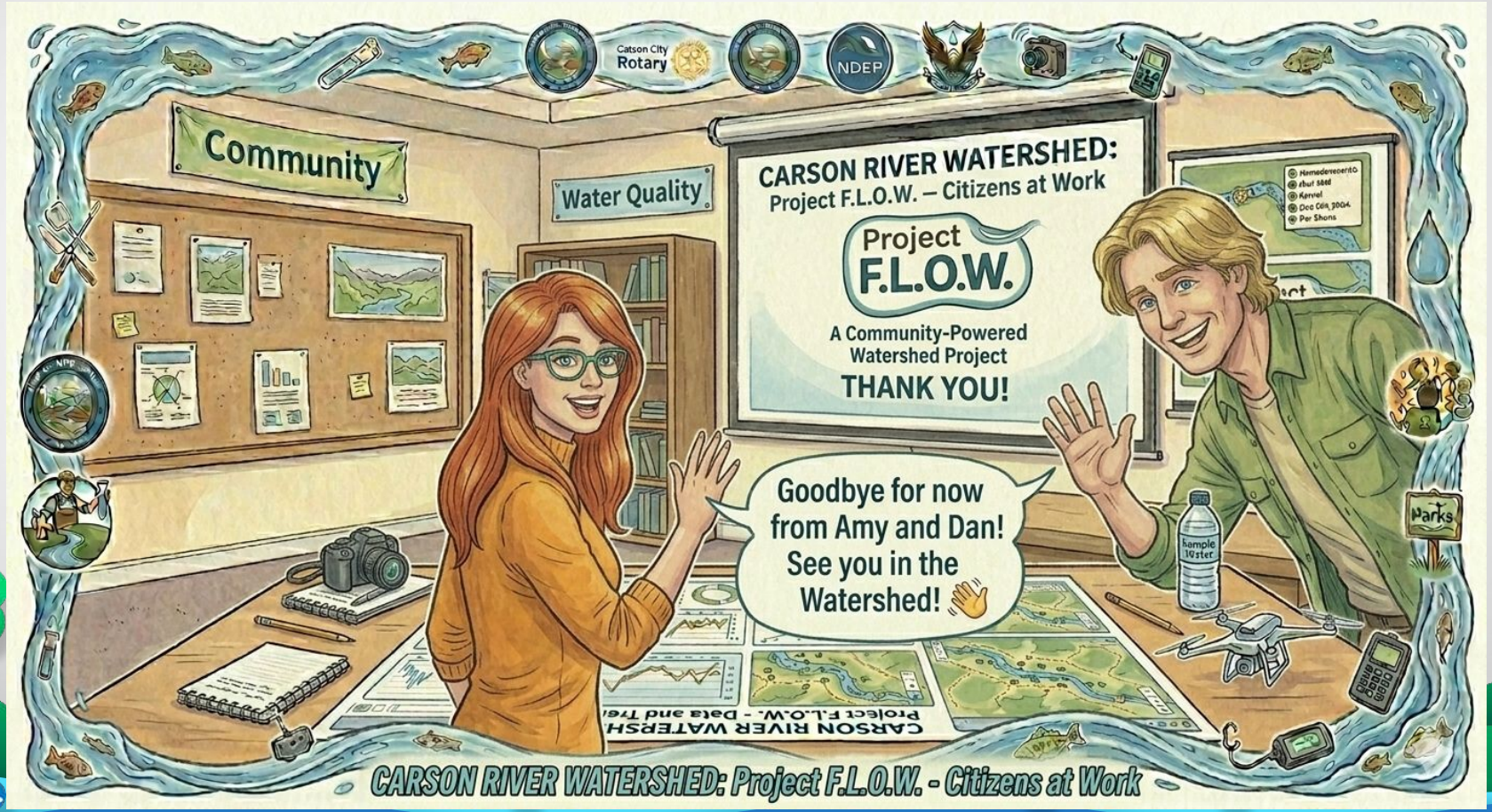
Thank you to the partners, supporters, students, and community members who helped turn this idea into a real student-led citizen science project.

Special thanks to:

- **Rotary Club of Carson City** for funding the equipment and believing in the vision
- **Nevada Division of Environmental Protection** for technical guidance, calibration support, and scientific expertise
- **River Wranglers** for watershed education and student-centered environmental learning
- **Carson City Parks & Recreation** for supporting access and stewardship along the river
- **Eagle Valley Middle School and Ms. Hoppe** for supporting a big idea that started with, “This might sound a little far-fetched…”
- **Green Biz Kidz** for being brave, curious, capable, and willing to do real science

Also, at this time, only one student fell in the river. So honestly, we are already calling this a success.

Questions?


Carson City Rotary
NDEP
Community
Water Quality
CARSON RIVER WATERSHED:
Project F.L.O.W. – Citizens at Work
Project F.L.O.W.
A Community-Powered Watershed Project
THANK YOU!
Goodbye for now from Amy and Dan! See you in the Watershed!
Parks
CARSON RIVER WATERSHED: Project F.L.O.W. - Citizens at Work