

Project ID:	2022 - IWMP - 18
Project Description:	Protect water quality in the upper Yampa River watershed & Stagecoach Reservoir
Reason for Project:	Further inventory, modeling, and water sampling of the sub-basin above and including Stagecoach Reservoir to fine tune sources of nutrient and sediment loading and other possible causes of prolific and sometimes toxic algae blooms. Develop and implement land and water management practices that will mitigate possible sources and related impacts to the health of the watershed.
Project Status:	Please see attached
Lead Proponent:	UYWCD & UYWG
Lead Contact:	Lyn Halliday
Partners:	UYWG, UYWCD, NASA, CSU, NREL & Others TBD
Estimate Cost:	\$200,000 per year
Water District	Upper Yampa Basin
Project Key Words:	Nutrient Management / Toxic Algae Blooms
Estimate Yield:	N/A
Water Right Needed:	N/A
Latitude/Longitude:	N/A
Funding Sources:	TBD
Schedule:	2+ years
BIP Obj. Addressed	Maintain and consider the existing natural range of water quality that is necessary for current and anticipated water uses
Needs & Next Steps	Acquire funding to support project; -Form collaborative stakeholder sub-committee of Upper Yampa Watershed Group; -Prepare work plan to include the following components with stakeholder participation throughout: 1. water quality sampling in tributaries and lake -hire outside expertise to develop monitoring plan; 2. perform modeling of sub-basin inputs; -engage CSU, NREL and other agencies 3. prepare GIS mapping inventories and findings; 4. consensus building to develop mitigation strategies and best practices; 5. implementation.

Upper Yampa River Watershed Plan 2016
Identified nutrient & sediment loading as concern/
indicators of system out of balance

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Watershed Group commissioned USGS study
quantifying loading & identifying anomalies 2018, BRT
funding approved Feb 2019. Final report 2020

Stagecoach State Park - tested
positive for toxic blue green algae
2018

Steamboat Lake closure for
toxic blue green algae summer
2021

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Watershed Group along with UYWCD initiated Bear
River Sub-basin Project focusing on inputs to and
within Stagecoach Reservoir 2019 to further explore
sources - natural vs. anthropogenic

-Stakeholder Group formed
-Educational Modules created
-Funding acquired
-Data compilation
-Seeking input on sources & approach - next steps

CDPHEReg. 85 Nutrient
Standards

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1. GIS mapping/ground truthing (see list)
complimenting existing maps created by WG & others
-Identify vulnerable areas
-Water quality sampling data gaps/ RFP for
outsourcing
-Develop mitigation strategies
-Create demonstration projects
-Incorporate measurement metrics
-Implement on broader scale

2. Extrapolation via modeling

Combination thereof?

3. Create & implement best practices &
educational outputs using takeaways from
other similar projects to include:

-septic system management/education
-riparian area buffers
-in-lake management
-stormwater management
-erosion control
-emissions
-soil health improvement best practices

Update on the project entitled: Protecting Water Quality in the Sub-basin Above and Including Stagecoach Reservoir (aka “Algae Project”)

Update respectfully submitted by Lyn Halliday, Upper Yampa River Watershed Coordinator and Project Lead
6/23/23

Overview

The purpose of the Water Quality Analysis in the Upper Yampa River Watershed and Stagecoach Reservoir Project is to analyze and quantify the human and environmental factors that may contribute to detrimental algal blooms in the Upper Yampa River Watershed (Bear River Sub-Basin) above and including Stagecoach Reservoir. The proposed project is derived from the Upper Yampa Watershed Plan (Halliday, 2016), a collaborative effort of the Upper Yampa River Watershed Group (UYWG) and a primary supporter and fiscal sponsor the Upper Yampa Water Conservancy District (UYWCD), Andy Rossi co-lead. The USGS (Day, 2021) reported findings of streamflow and water quality in a study based on the same watershed plan and confirms the need for more analysis of factors influencing prolific algal growth among other conclusions. Public education and stakeholder group engagement are important components of the project methodology.

Stakeholder Group

A Stakeholder Group was convened, comprised of a diverse membership of water managers, ag producers, NGOs and government agencies. The Group, assisted by project leads Halliday, Rossi and Woodmansee, has been working tirelessly to compile existing data available within the planning area with the goal of identifying data gaps and ultimately creating a viable water quality analysis program to help identify and quantify potential sources and stressors of nutrient loading and toxic algae blooms in the Stagecoach Reservoir.

To kick off the project, a set of five educational/training modules was developed by Dr. Robert Woodmansee, project co-lead and presented to the Stakeholder Group that 1) outlined the problem; 2) presented the scope of the project; 3) identified potential sources of nutrients; 4) provided an overview of nutrient cycling and related stressors; and 5) examined potential methodologies of arriving at sustainable solutions.

The UYWG was fortunate to partner with the NASA/NREL DEVELOP Team to utilize remote sensing to evaluate five lakes including Stagecoach Reservoir, Steamboat Lake and others in the Upper Yampa Basin relative to current and historic algae growth. The team generated time series plots and maps exhibiting parameters such as greenness, temperature, Apparent Visible Wavelength (AVW), and Broad Wavelength Algae Index (BWA). Evaluation plots were created to analyze the correlation between spectral indices and in-situ measurements. The final report titled “Yampa Water Resources: Monitoring Water Quality and Evaluating Potential Drivers of Algae Blooms in the Upper Yampa River Watershed” was recently published.

The Stakeholder Group has met monthly to learn about and discuss a wide variety of related topics. Presentations to the group to date have included:

2022

- June - Algae related studies in Rocky Mountain State Park, the White River basin, and in the Pacific Northwest by Dr. Jill Baron, USGS/CSU;
- June –Education Modules: Nitrogen and Phosphorus moving through the watershed by Woodmansee;
- July - Upper Yampa Water Quality USGS Sampling Data Annual Update by Cory Williams and Natalie

Day;

- August - Estimating Groundwater Contributions to Base Flow in the Upper Colorado River Basin, Groundwater Signature Study by Connor Newman, Hydrologist, USGS
- September – CSU/CAWA Agriculture Edge-of-field study in Yampa basin presentation by Eric Wardle CSU Ag Water Quality Program and Christina Welsh;
- October – Wastewater Treatment Plants and Septic System data by Scott Cowman Routt County Environmental Health Department;
- December – DEVELOP Team – NASA/NREL – remote sensing historic data comparison for algae in 5 lakes in the Yampa basin (including Stagecoach Reservoir) by Tony Vorster, CSU, Sarah Hettema.

2023

- January- GIS mapping data and gaps by Halliday;
- February - Results of Agricultural Edge of Field study in Yampa basin by Erik Wardle, CSU;
- March - Snow Chemistry Study by USGS made by Graham Sexstone;
 - Nutrient loading summary presentation by USGS Natalie Day;
 - USGS water quality data above and below Stagecoach reservoir by Trisha Solberg/Natalie Day;
 - Blue Mesa Reservoir HAB work Natalie Day;
- May - Water Quality Data Dashboard Demo by UYWCD Emily Lowell and Andy Rossi;
 - Upland conditions and nutrient movement through the watershed by Woodmansee;
- June – Nutrient Management Plan Formulation and current funding opportunities by Clinton Whitton, NRCS Resource Conservation Lead

Current Status and Next Steps

As a result of the aforementioned efforts, data compilation and identification of data gaps tasks are nearly complete with the next step being the formulation of a water quality sampling program in conjunction with assessing appropriate models and model components.

This being a complex and lengthy process, continued progress is being made and a quick fix is not anticipated. Additionally being wrapped into the project is CDPHE Regulation 85 (development of nutrient standards and regulations) which is moving closer to implementation to regulate lakes. The progress of this program is being monitored by the UYWCD and the Algae Project Stakeholder Group to try to get ahead of the process.