



**HOOD COLLEGE**

DIVISION OF ACADEMIC AFFAIRS

Center for Coastal and Watershed Studies



**WHAT'S INSIDE**

**PROJECTS | CENTER HAPPENINGS | MEET THE STAFF**

# CENTER FOR COASTAL AND WATERSHED STUDIES

**2024 Annual Report**

[hood.edu/CCWS](https://hood.edu/CCWS)





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# OUR MISSION

From coastal environments to the temperate, forested mountains, the Center for Coastal and Watershed Studies (CCWS) at Hood College examines all aspects of watersheds. The mission of CCWS is to develop an understanding of the origins, complications and potential solutions to environmental and social impacts in regional and global watersheds through faculty and student research projects.

## MESSAGE FROM THE DIRECTOR



### HELLO FROM THE CENTER FOR COASTAL AND WATERSHED STUDIES,

The past year was an exciting time for CCWS at Hood, with new and continued research projects, events and, most importantly, hands-on learning for students. As you will read in the following annual report, we have been busy!

Monitoring for safe use of local environments was a continued objective. We worked with the Lake Linganore Homeowners Association and the Potomac Riverkeeper Network, among others. With the help of the computer science faculty, we also recently embarked on a project with our city and county governments to monitor air quality and temperatures in the region.

The Frederick Food Security Network (FFSN) continues to address food insecurity and the need for fresh vegetables for low-income families. This year, much of our efforts were placed on repairing and maintaining greenhouse facilities that are key to our programming.

Our sustainability studies program has been gaining momentum. New faculty hired in the areas of ecology, biodiversity and public health have added unique perspectives to our growing program. Check out the current projects that brought students and faculty together to explore long-term sustainable solutions.

We are looking forward to fall 2025, with new field sites and new instructors invigorating the coastal studies program. Students are beginning to sign up for another great semester. In fact, we are seeing increased participation of students from other institutions, who join us for study-away experiences from their home colleges and universities.

I hope you enjoy reading about our 2024 milestones and learning what our amazing students have accomplished. Thank you for supporting our efforts to educate the next generation of environmental stewards and researchers, whose passion for protecting our coasts and waterways is truly an inspiration.

Sincerely,

Drew Ferrier, Ph.D.

Director, Center for Coastal and Watershed Studies





# Stream Temperature Monitoring Frederick, MD

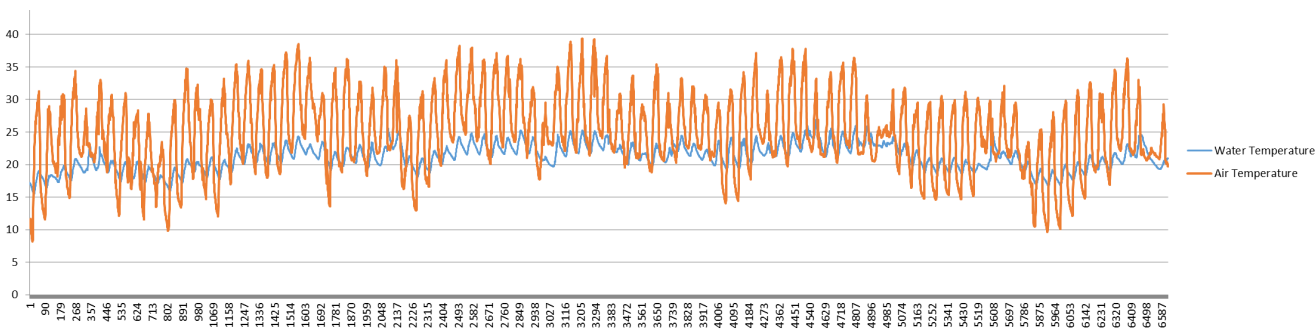
This is our sixth year partnering with the City of Frederick in conducting a temperature survey for six stream reaches in Frederick for three purposes:

- 1. To collect a fifth year of baseline data for stream sections slated for potential restoration projects.
- 2. To continue characterizing the temperature variation within the streams during the study period.
- 3. To assess the usefulness of a thermal infrared sensing drone to locate areas of groundwater influence within stream channels.

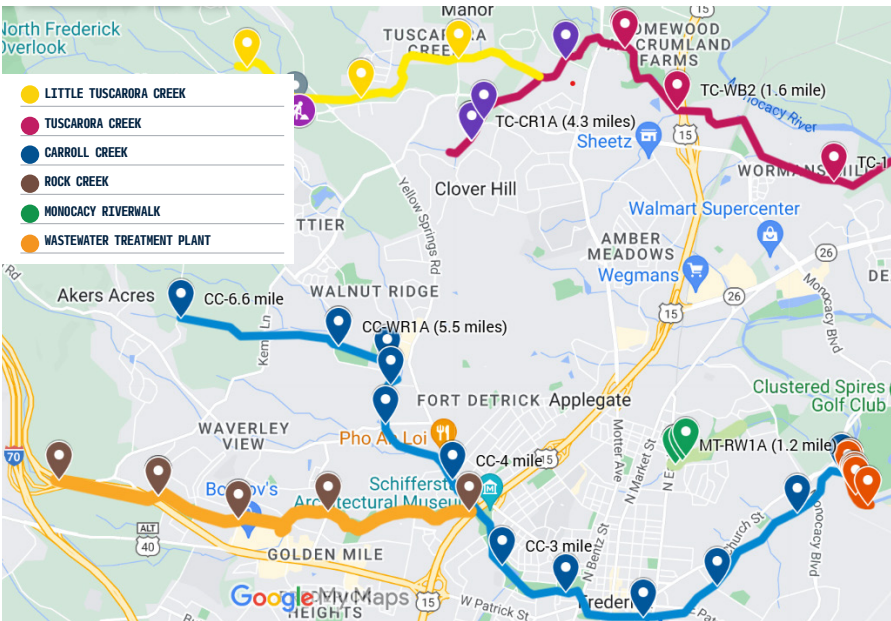
A total of 48 loggers were deployed along six stream reaches. *See map below.*

|                      | WASTEWATER TREATMENT PLANT | LITTLE TUSCARORA CREEK | RIVERWALK | ROCK CREEK | TUSCARORA CREEK | CARROLL CREEK |
|----------------------|----------------------------|------------------------|-----------|------------|-----------------|---------------|
| Average Temp oC      | 25.81                      | 28.68                  | 21.36     | 28.59      | 21.16           | 21.33         |
| Max. Temp oC         | 32.77                      | 27.67                  | 33.83     | 27.58      | 26.64           | 25.87         |
| Min. Temp oC         | 15.53                      | 13.43                  | 15.14     | 13.68      | 12.48           | 13.47         |
| 90th Percentile (oC) | 28.23                      | 23.85                  | 26.84     | 23.72      | 24.86           | 25.14         |
| % time >=20C         | 99%                        | 60%                    | 58%       | 61%        | 69%             | 65%           |
| % time >=24C         | 78%                        | 9%                     | 25%       | 9%         | 11%             | 22%           |

## CARROLL CREEK AT BAKER PARK



## STREAM TEMPERATURE MAP





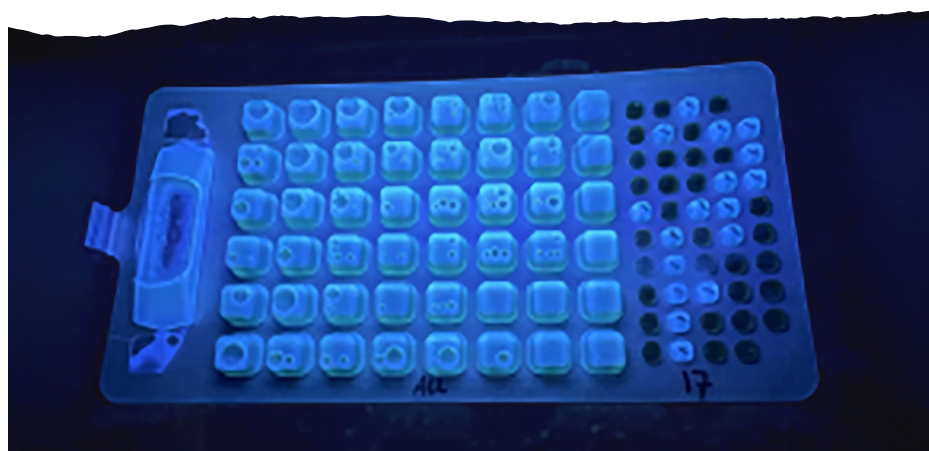
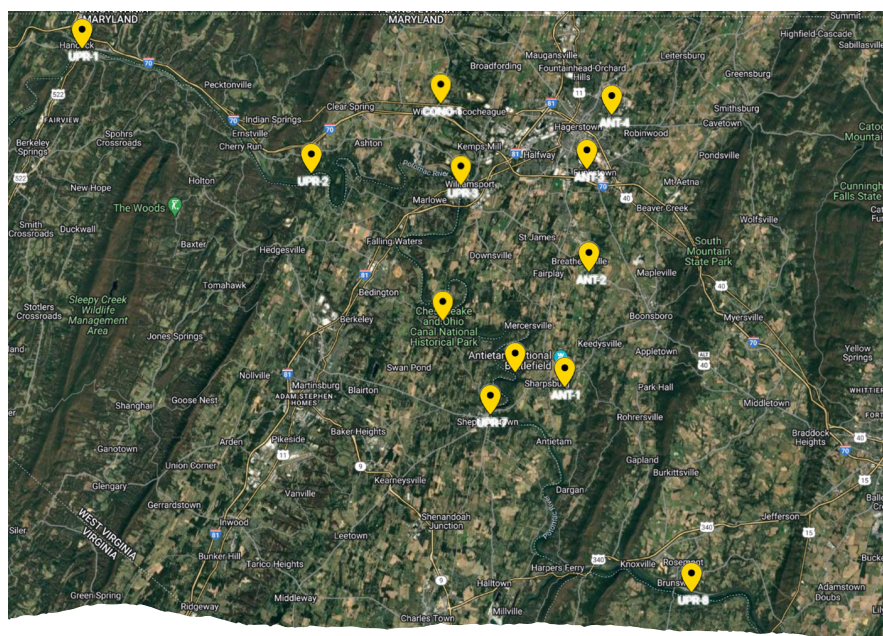
## PRKN Bacteria Sampling Washington County, MD

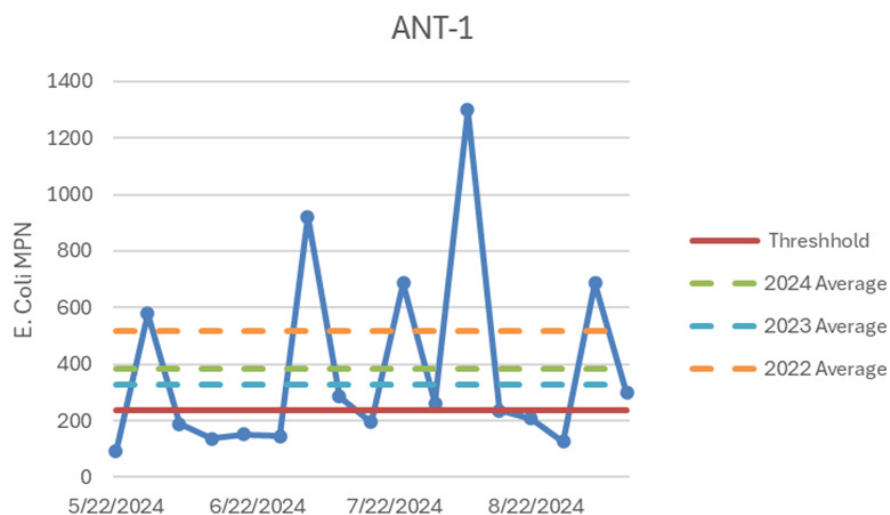
CCWS provided the Upper Potomac Riverkeeper with a student intern, Ali Werlang '25, to coordinate the volunteer bacteria monitoring program for its third year. Weekly water samples were taken from 12 popular recreational sites in Washington County and the Hagerstown area. These samples were tested for *E. coli*, which is an indicator bacterium that assesses the health and safety of the water. The IDEXX method was used at the Hood College lab to determine *E. coli* MPN (Most Probable Number). An MPN  $\geq 235$  is considered unsafe by Maryland's standards; therefore, a site passes if the MPN is below 235.

The results of the tests were made publicly available through social media and on [theswimguide.org](https://theswimguide.org). The samples were collected and analyzed by Thursday of every week between May 22 and Sept. 11 so that the public could make informed decisions regarding recreating at or close to any of the sample locations.

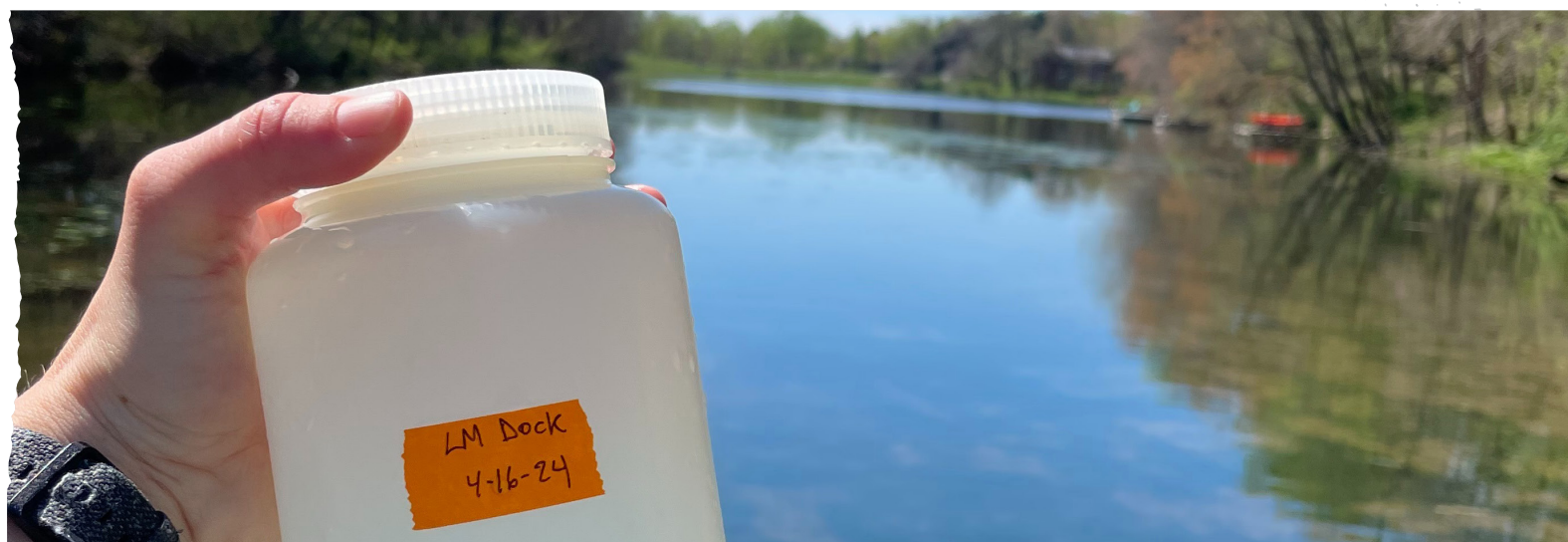
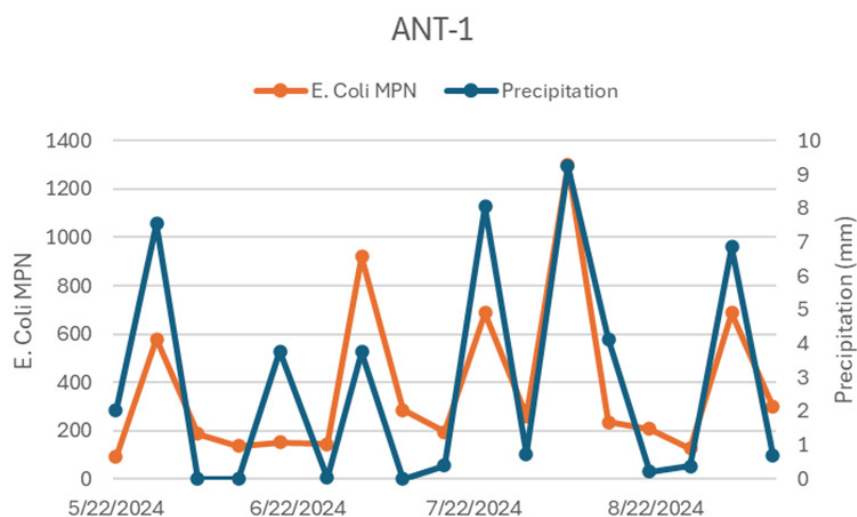
Here's a look at how this past summer's data compares to the previous two years at a site from Antietam Creek (ANT-1 = Burnside Bridge) and the Potomac River (UPR-2 = McCoy's Ferry Campground).

*See pages 5 and 6 for data.*

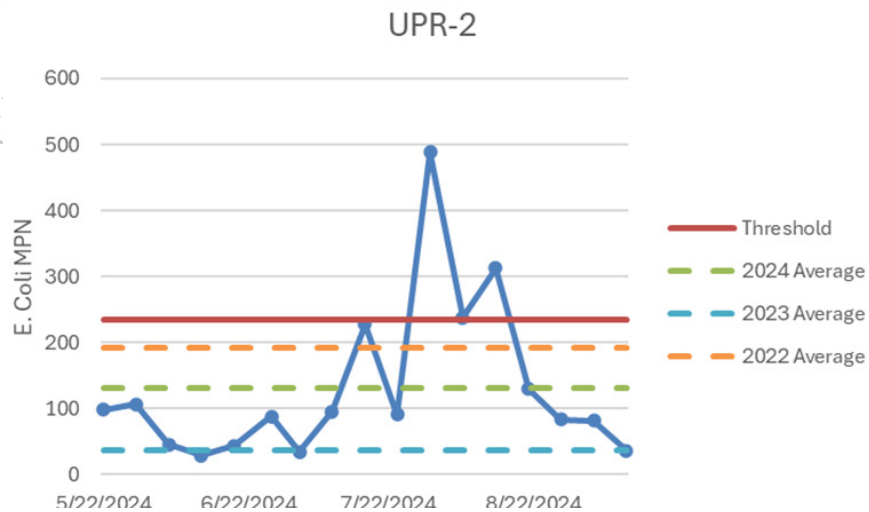




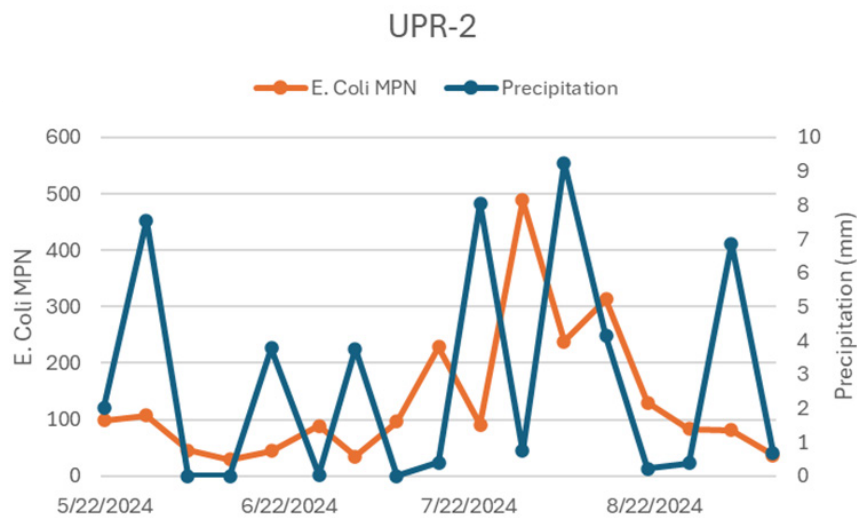
The E. coli peaks seen at this site along Antietam Creek correlate with precipitation events. A Streamstats report for this site indicated a 5.71% coverage of forested land for this basin area. This low forest coverage yields high farm runoff potential.







The site along the Potomac River is relatively “clean” with a high forest coverage of 89.5% to filter any runoff. The peaks are likely due to precipitation events that wash fecal bacteria down into the waterway from upriver.





## Algal and Cyanobacterial Identification and Enumeration Maryland

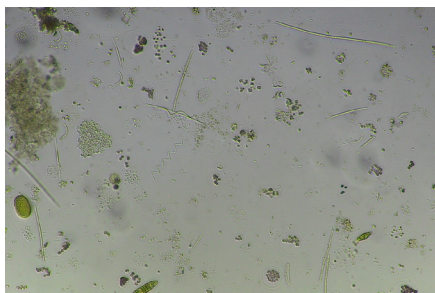
Maryland Department of Natural Resources contracted CCWS for a fourth year to provide algal and cyanobacterial identification on samples from state lakes. During the fall, CCWS received and identified 100 samples, including both live and preserved sample states.

Algal enumeration was completed by using three different categories:

1. 1-9 cells counted = present
2. 10-19 cells counted = common
3. >20 cells counted = abundant



Aphanizomenon sp. and Raphidiopsis sp. are toxin-producing filamentous cyanobacteria commonly seen in lakes in Maryland. This sample was taken at Unicorn Pond on 8/21/24.



This sample was taken from Cypress Branch in Millington, MD on 8/28/24. Many different green algae and cyanobacteria are depicted in this photo.

## Particulate Matter (PM2.5) Frederick County and City

Contracts were signed between CCWS and the City of Frederick as well as between CCWS and Frederick County to monitor and analyze particulate matter (PM2.5) levels throughout the city and county, respectively. CCWS is working closely with the computer science department to download the air monitors' data and analyze it quarterly throughout 2025.

The contract with the City of Frederick will involve additional air loggers that will monitor air temperature with the PM2.5 air quality monitors. Air temperature and particulate matter trends will then be analyzed by both the Hood College computer science department and CCWS and reported back to the City of Frederick. Implementation of these two projects will occur in 2025.

# FREDERICK FOOD SECURITY NETWORK (FFSN)

## Greenhouse and Garden Upgrades

With generous contributions from the Frederick Community Foundation and Frederick Health, we successfully relocated the timber frame greenhouse and pavilion to the resource garden, which has provided additional capacity to grow specialty crops and seedlings. The pavilion now serves as an outdoor meeting space for students and volunteers, enhancing collaboration and community involvement.

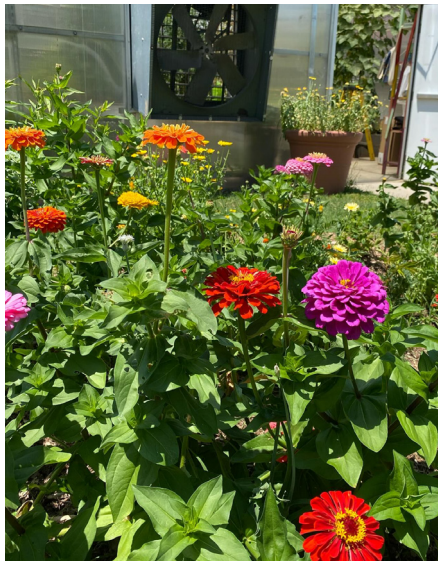
Additionally, we completed necessary upgrades to the greenhouses at the Scott Key Center, which have been instrumental in ensuring a successful growing season. These upgrades included the plumbing system, cooling system restoration, electrical infrastructure enhancement and the establishment of an aesthetic flower garden bed in front of the greenhouse. As a result, we harvested a bountiful selection of tomatoes, cucumbers, sweet peppers, salad turnips, beans, broccoli, basil and hot peppers, totaling more than 300 pounds of nutritious vegetables donated to the Frederick Community Fridge.

Last fall, we erected four raised garden beds, significantly increasing our growing capacity. Notably, one of these beds yielded more than 140 pounds of vegetables, which has greatly contributed to our overall harvest. In our efforts to diversify produce offerings, we successfully grew new varieties of hot peppers and salad turnips.





Student participation in FFSN involved produce production (ranging from planting seeds to harvesting), data tracking and distributing produce. Student workers Jo Sasse '25 and Ali Werlang '25 assisted at the Annual Plant Sale. Students work from spring through summer and into fall.





# Alternate Fall Break Day of Service

During fall break, we hosted Hood students for an alternative day of service. The students helped spread compost, dug beds and weeded to prepare the garden for the spring 2025 season. We are eagerly awaiting the 2025 planting and harvesting seasons.





# SUSTAINABILITY STUDIES PROGRAM

## Black Soldier Fly Summer Research

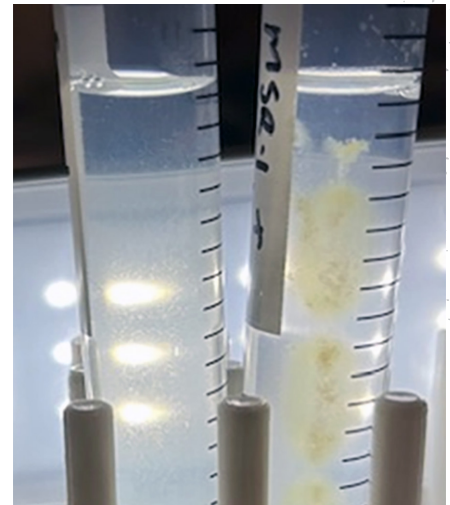
With the support of Summer Research Institute funding, Professor Yanting Guo, Ph.D., worked with two undergraduate students, Jo Sasse '25 and Isabella DiPietrantonio '25, on two studies during summer 2024. One of the projects focused on evaluating the efficacy of black soldier fly (BSF) horse manure frass as a natural fertilizer. Comparisons were made between the fertilization effect of horse manure frass, worm castings and topsoil on the growth of bok choy and basil. The other project was to test the ability of BSF larva consuming disposable paper products. The study compared BSF larvae's consumption rates on compostable and regular disposable products mixed with food waste.



## Biofuels from Algae

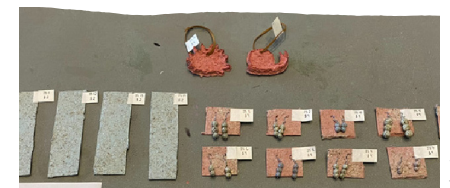
A team of Hood students and faculty were selected as finalists for the U.S. Department of Energy-sponsored 2023-25 AlgaePrize. Three faculty members (Craig Laufer, Ph.D., Drew Ferrier, Ph.D., and Daehwan Kim, Ph.D.) and seven students (Echo Ambrose '27, Riana Caldwell '25, Isabella DiPietrantonio '25, Garrett Hitchens '23, Ridley Little '24, Kayla Russell '24 and Jo Sasse '25) have been working on a project related to producing renewable biofuels from algae.

The research examined whether naturally magnetic bacteria, called *Magnetospirillum*, would bind to various microalgae and/or cyanobacteria, such that the algae/bacterial complex could then be captured with a magnet. This would be a novel approach to addressing one of the key hurdles in cost-effective production of algal biofuels. As the image to the right illustrates, we have been successful in demonstrating the "proof of principle" for this approach.



## Art Gallery Sale

The Hood College Art Gallery Sale was held in Nov. 2024. "Zoo paper" is a mixture of frass and recycled paper and was used to create winter holiday ornaments, earrings and bookmarks, originating from a small business class project in Sustainable Food Systems. These "zoo paper" products were sold at the annual art sale this year. They are a creative new way to make sustainable projects that appeal to the eco-conscious consumer.



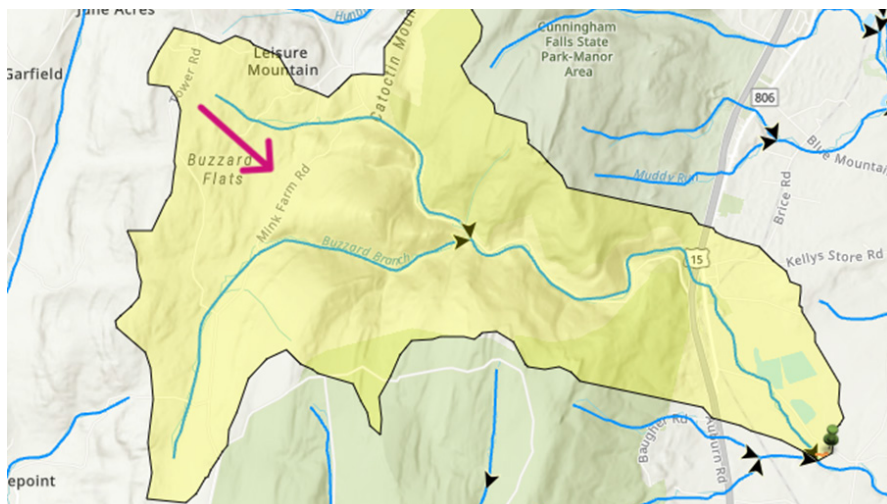


## Watershed Sustainability Lab at ThorpeWood

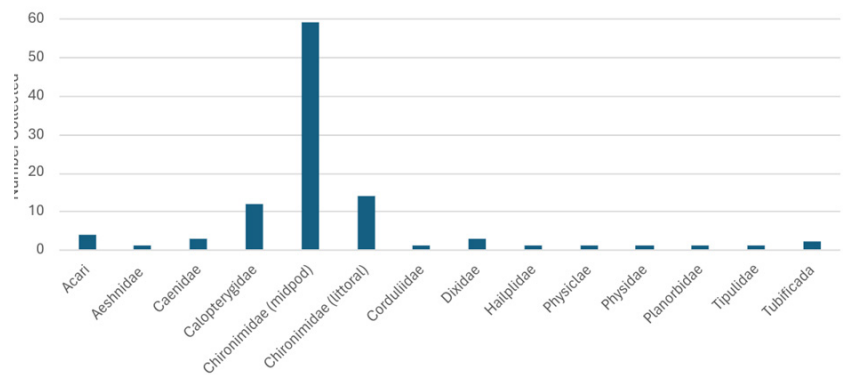
During the spring semester, Professor Drew Ferrier, Ph.D., taught the lecture portion of the upper-level course, Watershed Sustainability. Catherine Gaudlip, academic program coordinator, taught the lab portion of the course, where students dove into a semester-long project: a portfolio on the pond at ThorpeWood. This involved a compilation of all known information about this pond—biological, physical and chemical. Watershed basin morphology information was gathered, such as pond perimeter.

Nutrient chemistry data involved total nitrogen, total phosphorus, reactive phosphate and nitrate concentrations, which were all relatively low. Total suspended solids and organic material concentration were all low as well. A benthic macroinvertebrate survey revealed a balanced food web, with a mix of all functional feeding groups present. A fish survey yielded an abundant Bluegill Sunfish population. With all this data, ThorpeWood pond is concluded to be a healthy, productive ecosystem, with few indications of environmental stressors and threats of pollution.

Watershed basin map, with pink arrow indicating ThorpeWood, which is located in the Catoctin Mountains, 25 minutes north of Frederick.

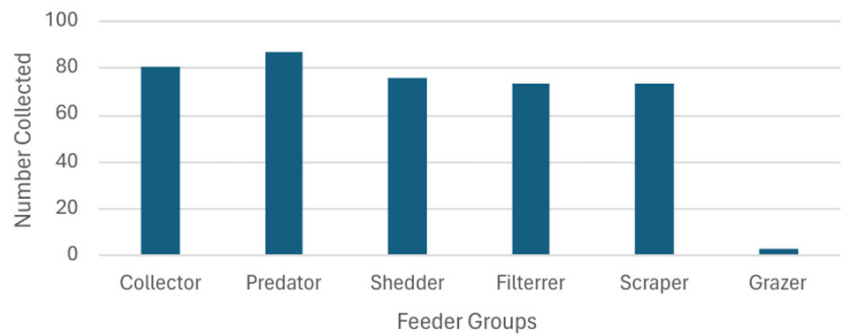


NUMBER OF ORGANISMS

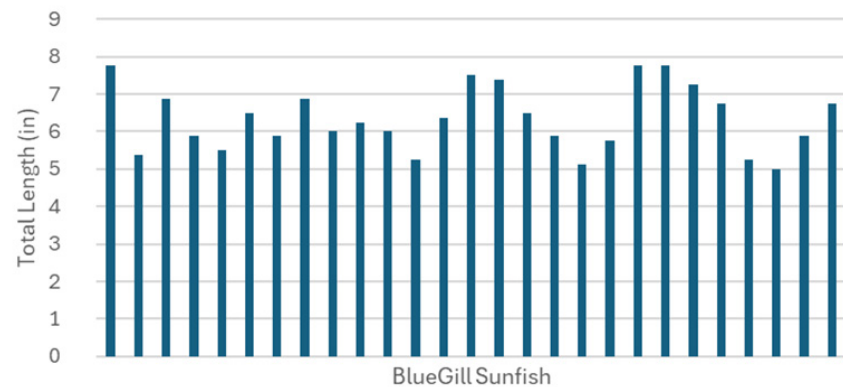


Data collected from the pond at ThorpeWood reveal a healthy ecosystem, with minimal threats of pollution.

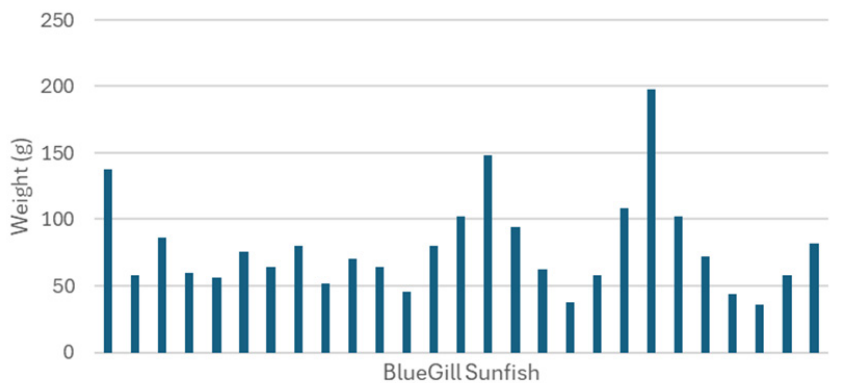
NUMBER OF MACROINVERTEBRATES IN EACH FEEDER GROUP



TOTAL LENGTH OF FISH CAUGHT DURING MARK AND CAPTURE PERIOD  
4/18-4/25/2025)



WEIGHT OF FISH CAUGHT DURING MARK AND CAPTURE PERIOD  
4/18-4/25/2025)





# COASTAL STUDIES PROGRAM

## Fall 2025 Coastal Studies Semester

The next cohort of students will participate in the Coastal Studies Semester this coming fall 2025. Applications are due during the spring semester. Consider joining us and spreading the word about this unique, experiential learning program. Contact Catherine Gaudlip (gaudlip@hood.edu) for more information. Stay tuned through our Facebook and Instagram pages, our website and our email list for upcoming information sessions and important deadlines.

Scan the QR code to apply!





# EXPERIENTIAL LEARNING

## **Undergraduate Student Internship: Ali Werlang '25**

Ali Werlang '25 is an environmental science and policy major, with a concentration in biology. She interned with the Potomac Riverkeeper Network for the 2024 Volunteer Bacteria Monitoring Program, where she coordinated volunteers for weekly sampling, performed lab analyses on the collected samples, communicated results in a timely manner, and analyzed and presented data at an end-of-year summary meeting with the Upper Potomac Riverkeeper. In addition to the internship, Werlang also worked for FFSN with greenhouse and garden upkeep as well as food donation drop-offs to the Community Fridge.



## **Graduate Student Internship: Gabriela Guiza, M.S.'22, M.S.'24**

Gabby Guiza, M.S.'22, M.S.'24, was a graduate student in the biomedical science and environmental biology programs. In spring 2024, she completed an internship with CCWS working with *Chlorella* sp. and *Microcystis* sp. cultures to calibrate our field and lab equipment, such as the YSI, AquaFluor and spectrophotometer. Guiza built growth curves and regression equations, which in turn helped CCWS conduct water quality assessments throughout Maryland, following QAQC protocols.



CCWS staff, summer workers and interns at a preparation meeting.

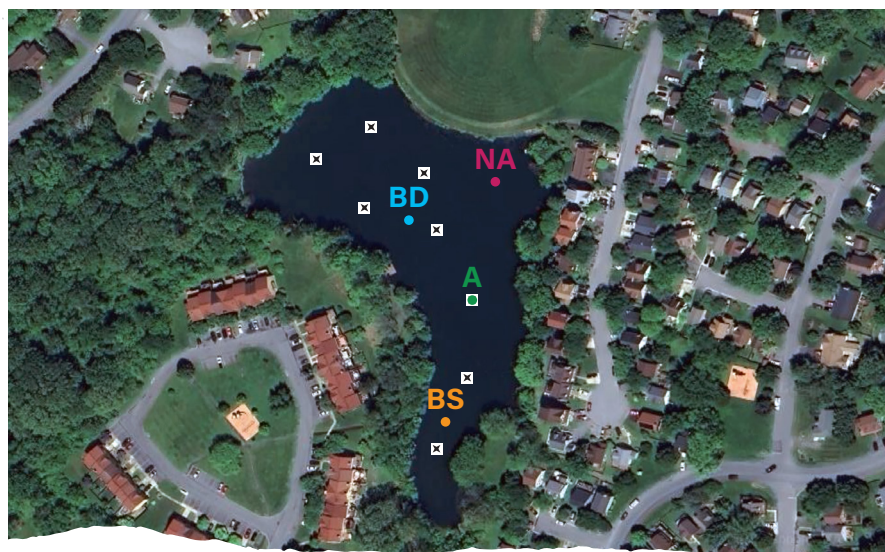


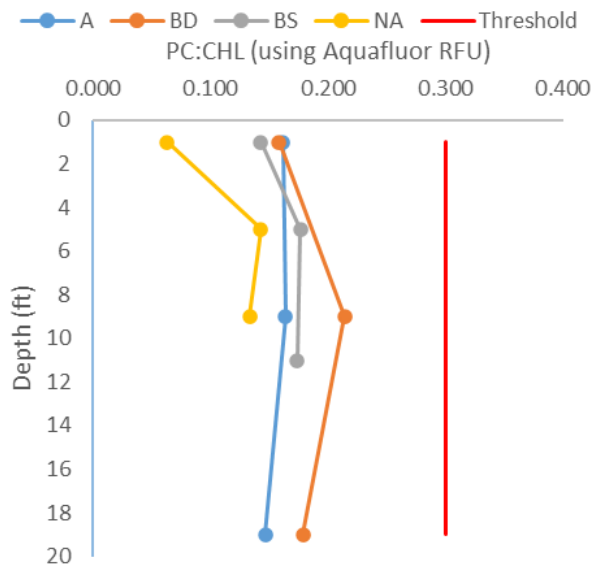
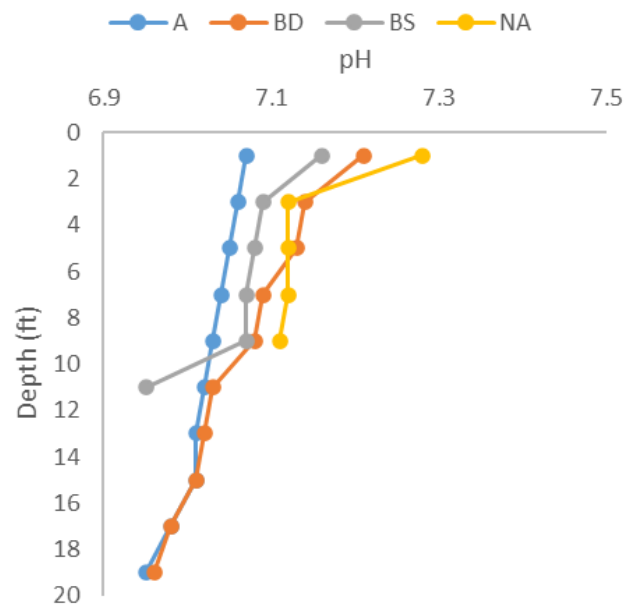
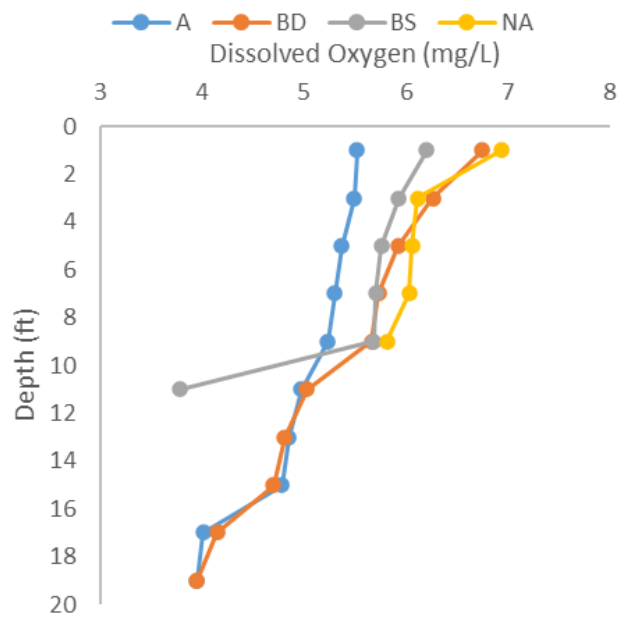
## Summer Student Worker: Christina Shaner '24

Christina Shaner '24 is a recent graduate of Hood College and has conducted four vertical profiles in Lake Anita-Louise to determine the range of effects in water quality of recently placed aerators. This lake has been aerated since the installation of eight aerators in July 2023.

Vertical profiles were taken at four different locations throughout the lake: above an aerator ("A"), a far corner where there was no aerator ("NA"), between aerators at a shallow depth ("BS") and between aerators at a deep depth ("BD").

Dissolved oxygen, pH and PC:CHL had little variation at the "Aerator" site and "Between Shallow" site, with greater variation at "No Aerator" and "Between Deep" sites. This is a huge difference from the previous year's vertical profiles, which yielded great stratification among those parameters.





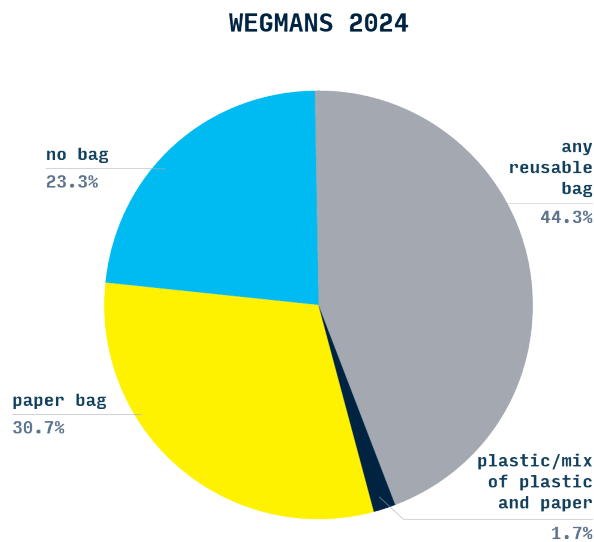
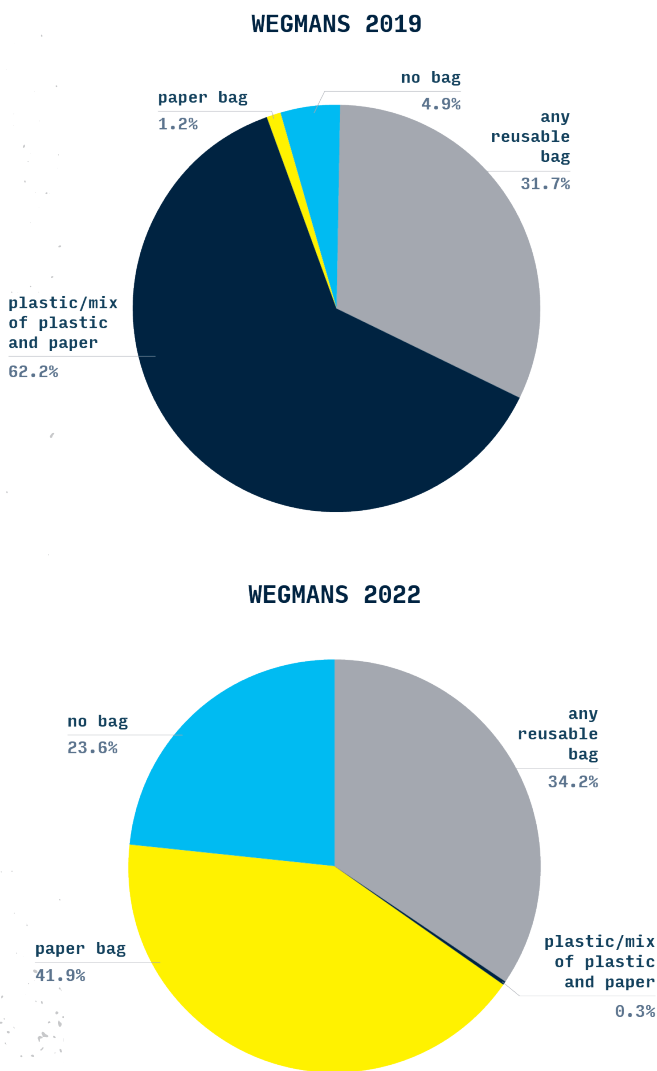
Vertical profiles of three different water quality parameters: pH, dissolved oxygen and PC:CHL. pH remain about neutral throughout the entire water column. Dissolved oxygen varies from 7 to 4mg/L from surface to bottom. PC:CHL is the ratio of Phycocyanon to Chlorophyll fluorescences. This ratio indicates presence of cyanobacteria to green algae. These ratios remained below the threshold of 0.3 throughout the entire water column.



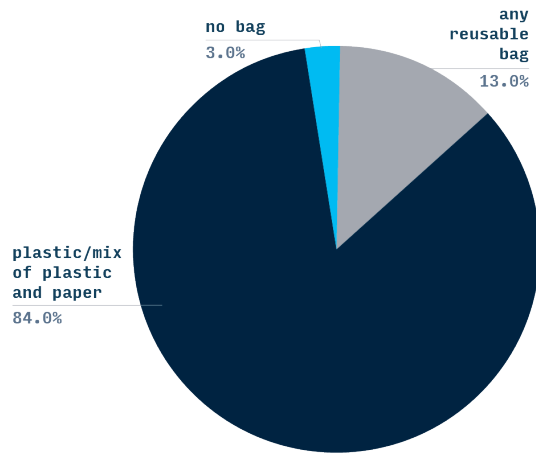


# Undergraduate Student Summer Internship: August Westdorp

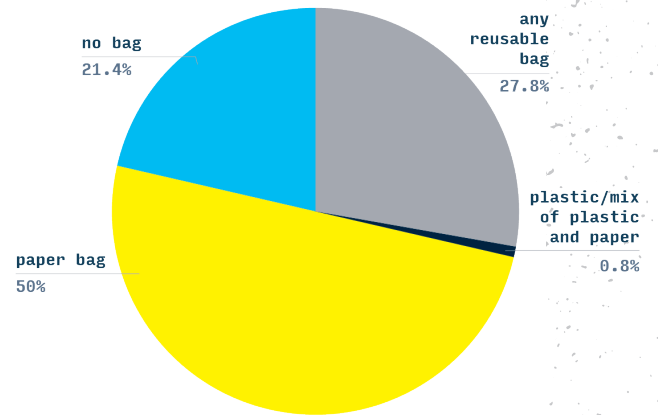
August Westdorp, an undergraduate student at St. Mary's College pursuing a degree in marine science, completed 160 credit hours this summer with CCWS. He participated in all of the center's projects, from Linganore water sampling to bacteria lab analyses for the Upper Potomac Riverkeeper Volunteer Bacteria Monitoring Program. He was also involved in stream temperature data logger management, including deployment and field checks of the data loggers. His independent "mini research project" was an analysis on plastic bag use at various local grocery stores in Frederick City.



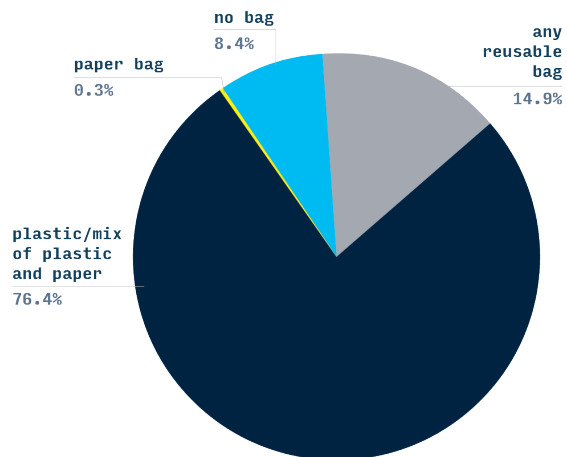
GIANT/FOODLION 2019



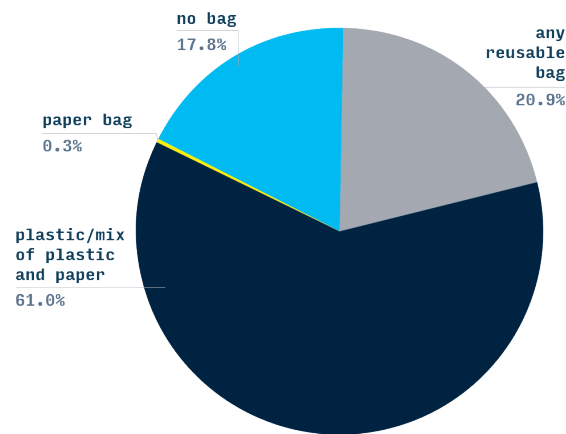
GIANT/FOODLION 2024



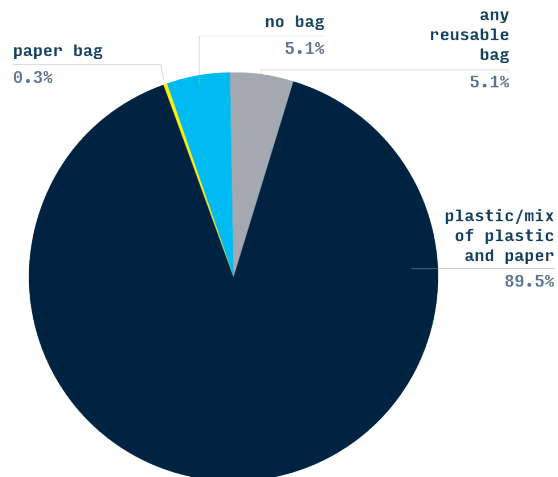
GIANT EAGLE 2019



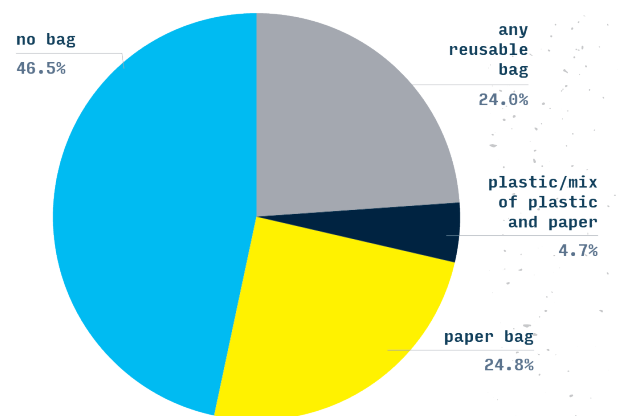
GIANT EAGLE 2024



WEIS 2019



WEIS 2024

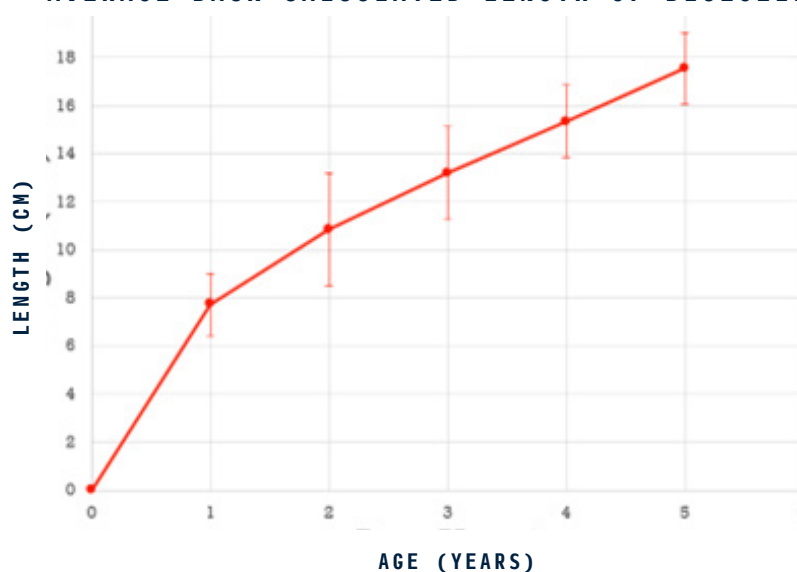




## Summer Student Worker: Austin Kaplan '26

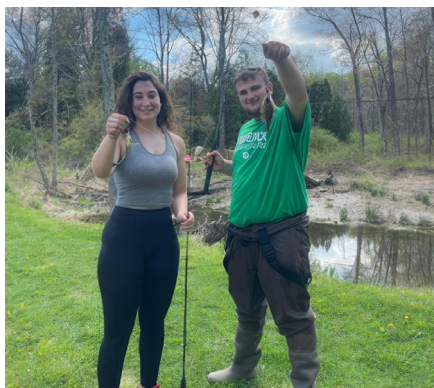
Austin Kaplan '26, a biology major and CCWS student technician, conducted an age and growth analysis of Bluegill captured from ThorpeWood pond. Using fish scales collected during an ongoing mark-recapture survey, Kaplan counted the number of annuli on scales to estimate the age of each fish. To determine growth, he measured total scale length as well as the distance between each annulus. The growth rate of the Bluegill population was graphed by using the relationship between total body length and scale length to back-calculate the length of individual Bluegill at each year of life. The center plans to continue its mark-recapture survey and collect more scales for these analyses in 2025.

AVERAGE BACK-CALCULATED LENGTH OF BLUEGILL

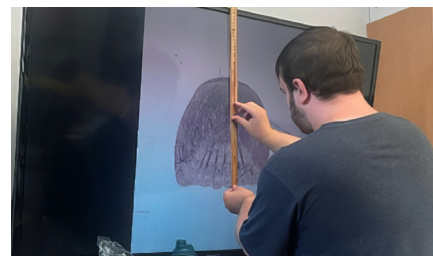


Austin Kaplan '26 counting annuli and measuring scale length.

Christina Shaner '24 (left) and Austin Kaplan '26 (right) with captured Bluegill.



SUS 302 students collecting fish scales.



Austin Kaplan '26 presents his summer 'mini research project' at the Center's end-of-summer presentations August 2024.

# EVENTS

## Earth Day

The City of Frederick hosted its annual Earth Day event in Baker Park. CCWS and FFSN set up a table display of seedlings and informed visitors of educational offerings in sustainability at Hood College. We met many new faces and saw familiar ones. Opportunities like this are always important, not only for networking and recruitment, but also for building connections and potential partnership in future projects.



## Climate Summit 2024

Hood hosted Mobilize Frederick's second annual Climate Summit on Feb. 2-3, with the theme of "Reason to Hope—Progress and Solutions to Climate Change." These two days consisted of keynote addresses and breakout sessions revolving around:

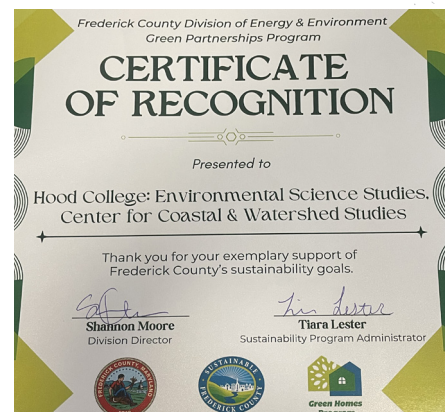
- Climate Justice
- Progress on Green Schools
- How We Measure Progress
- Electrifying Your Home for Owners and Renters
- Food Security
- Opportunities in Clean Economy
- Agriculture and Climate Change

Table exhibits showcased sponsors and local and regional programs, innovations and solutions by public and private sector organizations.



## GREEN PARTNERSHIP PROGRAM

CCWS and the Frederick County Division of Energy and Environment became partners in the new Green Partnership Program. This program is a network of meaningful connections between local organizations and the local government, striving to increase community engagement and participation in environmental programs and resources. CCWS contributes to this program through the Air Particulate Matter (PM2.5) Monitoring Project.



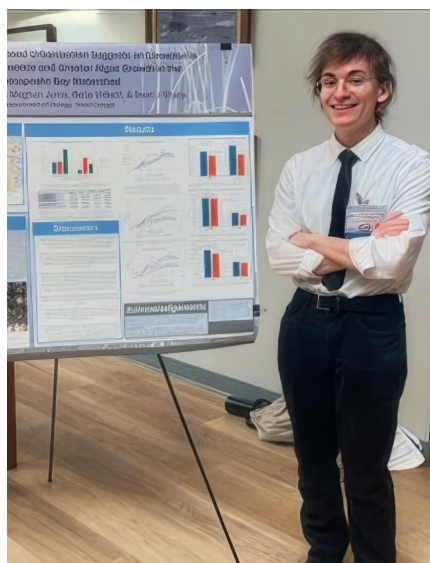
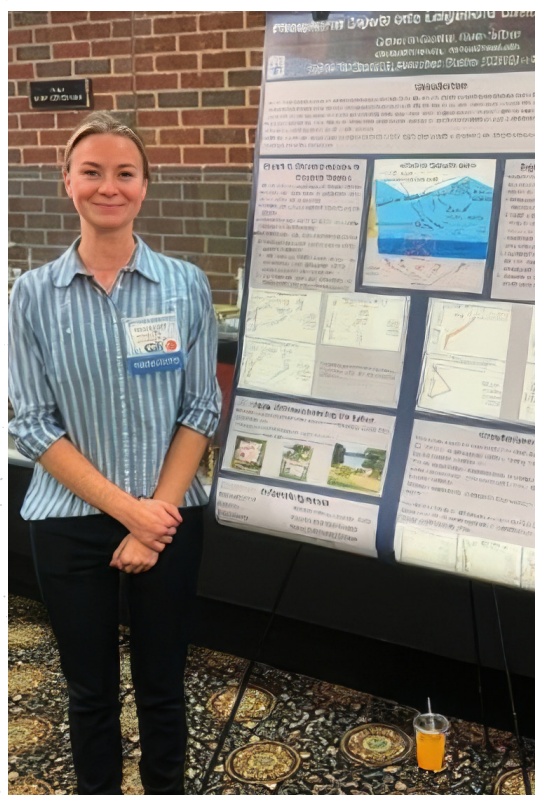


## Maryland Water Monitoring Council (MWMC) 2024 Annual Conference

CCWS, alongside the Department of Biology, was proud to represent Hood College at the 2024 MWMC Conference. Catherine Gaudlip, academic program coordinator, presented research conducted with the help of Kevin Sellner, Ph.D., senior scholar at CCWS, on phosphorus inputs into the Linganore Lakes.

Austin Kaplan '26, a student worker and aspiring aquatic ecologist, presented his research at the student poster session and student lightning talks. He won first place for his poster on the impact of the introduced Rainbow Darter on the habitat use of other Darter species. August Mullican '25, a biology major, also presented a poster on the link between increased urbanization and algae growth in the Chesapeake Bay Watershed. Christina Shaner '24, a graduate of the environmental science and policy program and former CCWS student worker, is now a Chesapeake Conservation and Climate Corps intern with the Chesapeake Bay Trust, and she also attended the event to support her Hood colleagues.

Clockwise: Austin Kaplan '26 presents at the student lightning talks; Austin Kaplan '26 with awarded for his poster and presentation; August Mullican '26 with his poster summarizing his research; Catherine Gaudlip with her poster summarizing her research.



# NEW PERSONNEL



## **Catherine Gaudlip** **Academic Program Coordinator**

Catherine Gaudlip has been at Hood College for five years, starting as a Chesapeake Conservation Corps intern in 2019, then becoming the field and lab technician on all our environmental service contracts in 2020. Since 2022, she has been an adjunct lab instructor for several courses: Biology of Food and Nutrition, Watershed Sustainability and Coastal Community Ecology. She also serves as the practicum course instructor for the Coastal Studies Semester. She began her new role as academic program coordinator in April 2024. Gaudlip earned a Bachelor of Science in Environmental Science at Washington College in 2019, with a double minor in chemistry and earth science.



## **Tierney Cantwell** **Chesapeake Conservation and** **Climate Corps Member**

Tierney Cantwell is a Chesapeake Conservation and Climate Corps member for Mobilize Frederick, with Hood College providing an office space. While serving with Mobilize Frederick, Cantwell supports a range of projects and initiatives, including energy efficient housing, climate data management and visualization, and youth sustainability team organization. Cantwell is a recent graduate of Gettysburg College, where she obtained a degree in biology with a minor in environmental science. Last summer, she was a NASA Student Airborne Research Program intern and performed hands-on environmental research at University of California Irvine. Cantwell spends time on CCWS environmental projects and assists with lab maintenance.



# STUDENT WORKERS

## Undergraduate Students

- Keene Chau '25, student volunteer, Environmental Services Division
- Austin Kaplan '26, student worker, Environmental Services Division
- Liam McGlinchey '25, student volunteer, Environmental Services Division
- Jo Sasse '25, student worker, Frederick Security Network
- Christina Shaner '24, student worker, Environmental Services Division
- Jack Welsh '28, student volunteer, Environmental Services Division
- August Westdorp, student intern, Environmental Services Division
- Ali Werlang '25, student worker, Environmental Services Division, Potomac Riverkeeper Network and Frederick Food Security Network



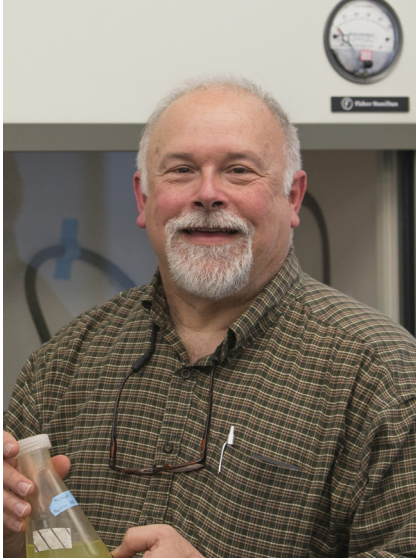
## Graduate Students

- Gabriela Guiza, M.S.'22, M.S.'24, student intern, Environmental Services Division
- Rasmus Denoke, student volunteer





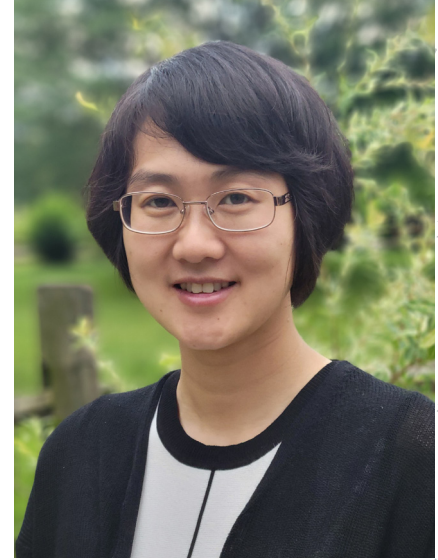
# MEET THE STAFF



**DREW FERRIER, PH.D.**  
PROFESSOR OF BIOLOGY,  
CCWS DIRECTOR



**CATHERINE GAUDLIP**  
ACADEMIC PROGRAM  
COORDINATOR



**YANTING GUO, PH.D.**  
ASSISTANT PROFESSOR OF  
BIOLOGY



**HAROUN HALLACK**  
FFSN MANAGER



**KEVIN SELLNER, PH.D.**  
SENIOR SCHOLAR



**EMILY SOUTHGATE, PH.D.**  
SENIOR SCHOLAR

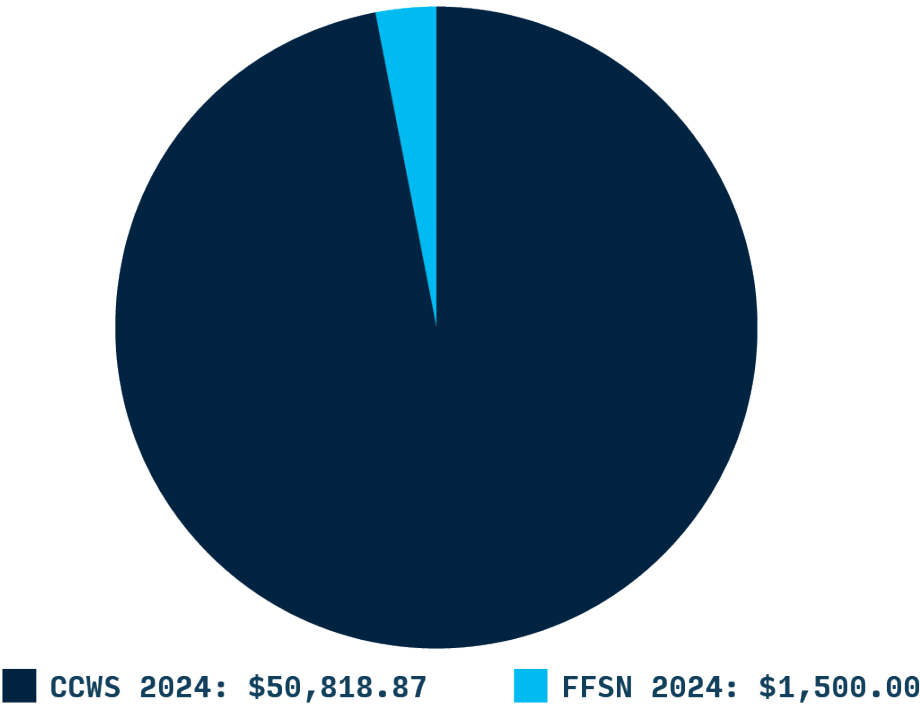


# GRANTS AND CONTRACTS

**CCWS: \$50,818.87**  
**FFSN: \$1,500**  
**Total Funding Obtained: \$52,318.87**

This includes proposals/projects written and conducted through the Center for Coastal and Watershed Studies involving Hood faculty, staff and students during the calendar year of 2024.

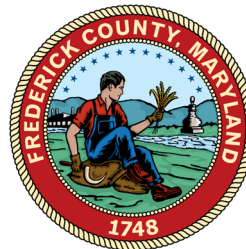
**JANUARY – DECEMBER 2024**  
**TOTAL FUNDING OBTAINED: \$52,318.87**



# PARTNERSHIPS

**Our work is made possible thanks to these invaluable local partnerships.**

The generous donations from these partners support environmental service projects that enhance student involvement and experiential learning. We value our community connections and are always excited to establish new partnerships.



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# STAY IN TOUCH



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**HOOD COLLEGE**

**DIVISION OF ACADEMIC AFFAIRS**

Center for Coastal and Watershed Studies