



November 17, 2023

**To:** Sara Strassman

**From:** Carter Borden, Dan Dauwalter, Kent Johnson

**Regarding:** TU Angler Science Activities in 2023: A Summary of WiseH2O App Usage in the Driftless Area

### Memorandum

Following a successful pilot project conducted by the Kiap-TU-Wish Chapter in Pierce County, Wisconsin in 2019, the Trout Unlimited (TU) Angler Science Program with the WiseH2O App expanded to the entire Driftless Area in 2020 - 2023. The goal of the program is to engage anglers and TU Chapters to become more informed and collect actionable data on Driftless Area trout streams. This 2023 Activities Report provides an overview of the program’s activities and effectiveness at collecting data and engaging anglers and Driftless Area TU Chapters towards the goal.

### WiseH2O App Observations

Since the inception of the Angler Science Driftless Area Program in 2019, 1848 observations have been made in the Driftless Area using the WiseH2O App of which 1788 observations since 2020 when the program was expanded to the entire Driftless Area (Table 1, Figure 1). Of the 778 observations made in 2023, 121 occurred during the “September Water Quality Sampling Blitz” contest used to effectively encourage participants to make observations during the last part of the fishing season (see below). Prizes consisting of TU-branded swag were awarded to randomly selected participants.

Table 1. 2019 - 2023 WiseH2O App observations and the frequency of data types collected with an observation.

Year	Observations	Water Source	5n1 Test Strip	2n1 Test Strip	Ortho-phosphate Test Strip	Stream Temperature	Stream Disturbances	Current Conditions
Analyses per observation								
2019*	60	60	46	0	41	41	55	46
2020	144	118	108	92	84	95	103	118
2021	407	382	361	309	324	304	281	337
2022	459	436	419	382	374	366	356	389
2023	778	740	689	684	647	702	656	706
Sum 2020-23	1788	1676	1577	1467	1429	1467	1396	1550
Percentage of total observations with each data type collected								
2020	-	82%	75%	64%	58%	66%	72%	82%
2021	-	94%	89%	76%	80%	75%	69%	83%
2022	-	95%	91%	83%	81%	80%	78%	85%
2023	-	95%	89%	88%	83%	90%	84%	91%

\*Due to further editing of the database, the number of observations in 2019 does not match the number reported in the 2019 and 2020 annual reports.

When making an App observation, users can report from one to all the data types in the App including water source, 5n1 test strip (alkalinity, hardness, pH), 2n1 test strip (nitrate, nitrite), orthophosphate test

strip, stream temperature, 7 stream disturbance types (present/absent), and current stream and recent weather conditions (Table 1). During the 2023 season, observers consistently reported most data categories when making an observation, with the lowest category being the orthophosphate test strip at 83%. Aside from the 5n1 test strip (-2%) and water source (no change), these percentages of use by category have increased between 1-16% for each category over the 2022 use percentages.

Spatially, observations have primarily been made in the northern 2/3<sup>rd</sup>s of the Driftless Area (Figure 1, Table 2). The TU Chapter domains with the most observations during the 2020 - 2023 period include, in order: Kiap-TU-Wish, Twin Cities TU, Hiawatha, Coulee Region, Wisconsin Clear Waters, and Win Cres. The 2023 season continued to witness a notable expansion of activity in the Iowa Driftless and Spring Creeks TU Chapter domains.

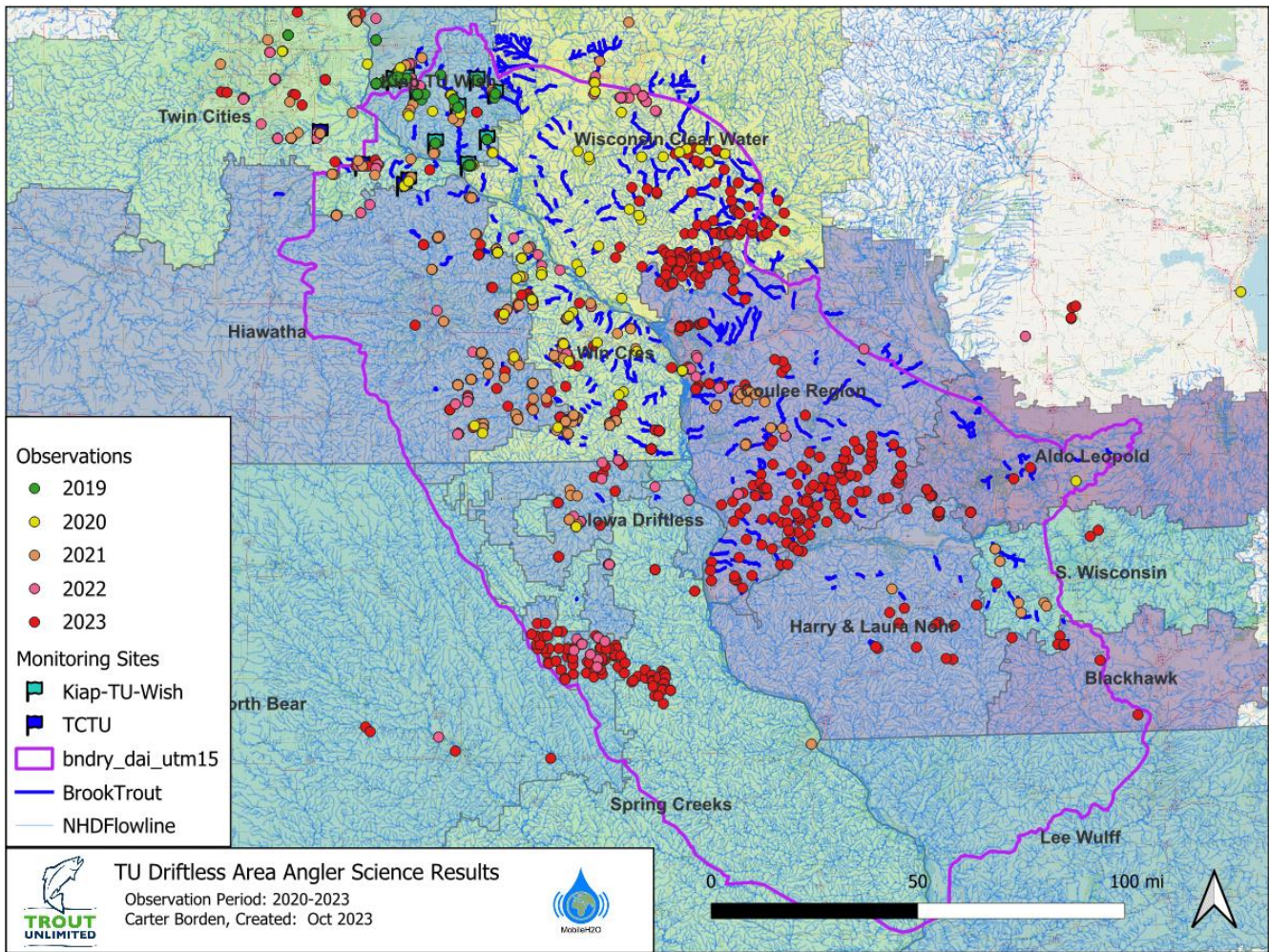


Figure 1. 2020 - 2023 TU Angler Science Program observations made in the Driftless Area and TU Chapter domains.

As the bottom third of the Driftless Area is not well covered, better engagement strategies are needed for the southwest Wisconsin, northeast Iowa, and northwestern Illinois TU Chapters. Furthermore, regionally illuminating the lack of observations could prompt anglers visiting the area from other TU Chapters and organizations to make observations. This is already being done by members of other TU Chapters, such as those in the Chicago, Illinois area (e.g., Oak Brook Chapter) that often visit the Driftless Area to submit

WiseH2O observations while fishing. Thus, promoting and incentivizing a regional push to expand observations into southern Driftless Area should be included in the 2024 season campaign.

Table 2. App observations made within TU Chapter domains.

TU Chapters	Total	2020	2021	2022	2023
Aldo Leopold	16	1	0	0	15
Blackhawk	6	0	0	0	6
Coulee Region	199	11	14	13	161
Harry & Laura Nohr	46	0	1	0	45
Hiawatha	256	8	105	60	83
Iowa Driftless	65	1	7	21	36
Kiap-TU-Wish	439	65	91	184	99
Lee Wulff	0	0	0	0	0
North Bear	27	0	0	4	23
Oak Brook	0	0	0	0	0
Southern Wisconsin	12	0	8	0	4
Spring Creeks	47	0	1	3	43
Twin Cities (TCTU)	309	4	109	111	85
Win Cres	163	12	50	34	67
Wisconsin Clear Waters	193	40	21	26	106
Other geographic domains	10	2	0	3	5

### Trout Streams/Brook Trout Streams

With brook trout being the only native trout in the Driftless Area, the conservation of this species and the protection and restoration of streams that support them is a high priority for Trout Unlimited and TUDARE. In 2020 - 2023, WiseH2O App users were encouraged to make observations on Driftless Area brook trout streams, to better characterize their water quality and habitat. Of the 1788 observations submitted in the 2020 - 2023 seasons, 1563 (89%) have been made on state designated trout streams and 663 (37%) have been made on brook trout streams (Figure 2). To promote characterizing brook trout streams, observations were counted twice in the September Water Quality Sampling Blitz contests.

### WiseH2O App Observer Participation

Since the beginning of the Angler Science Driftless Area Program in 2019, 160 unique observers have participated, with 146 unique observer IDs (given when users first log into the App) making observations in 2020 - 2023 (Table 3). The number of observers has increased each year since the program's inception, with 80 active observers submitting observations in 2023. Of the 80 observers, 42 returned from previous seasons and 38 were new observers to the program. The percentage change active and new observers from 2022 increased indicating an expansion in the program.

In addition to gaining observers, the number of observations per observer increased (on average) during the 2020 - 2023 period, indicating greater involvement with the program. In 2020, observers made 5.0 observations/observer (Table 3), with most collecting under 5 observations throughout the season (Figure 3, Table 3). During the 2021 and 2022 seasons, the average increased to 7.5 observations/observer, with many more observers making up to 10 observations and several dedicated individuals making 26-30



observations during the season. In 2023, the average increased to 9.7 observations/observer (Table 3). This is in part due to TU field crews employing the app during an inventory of culverts in Jackson, Trempealeau, Monroe, and Crawford counties in Wisconsin. Making observations along with culvert inventories is one reason why there are 8 observers with 36 or more observations in 2023 (Figure 3).

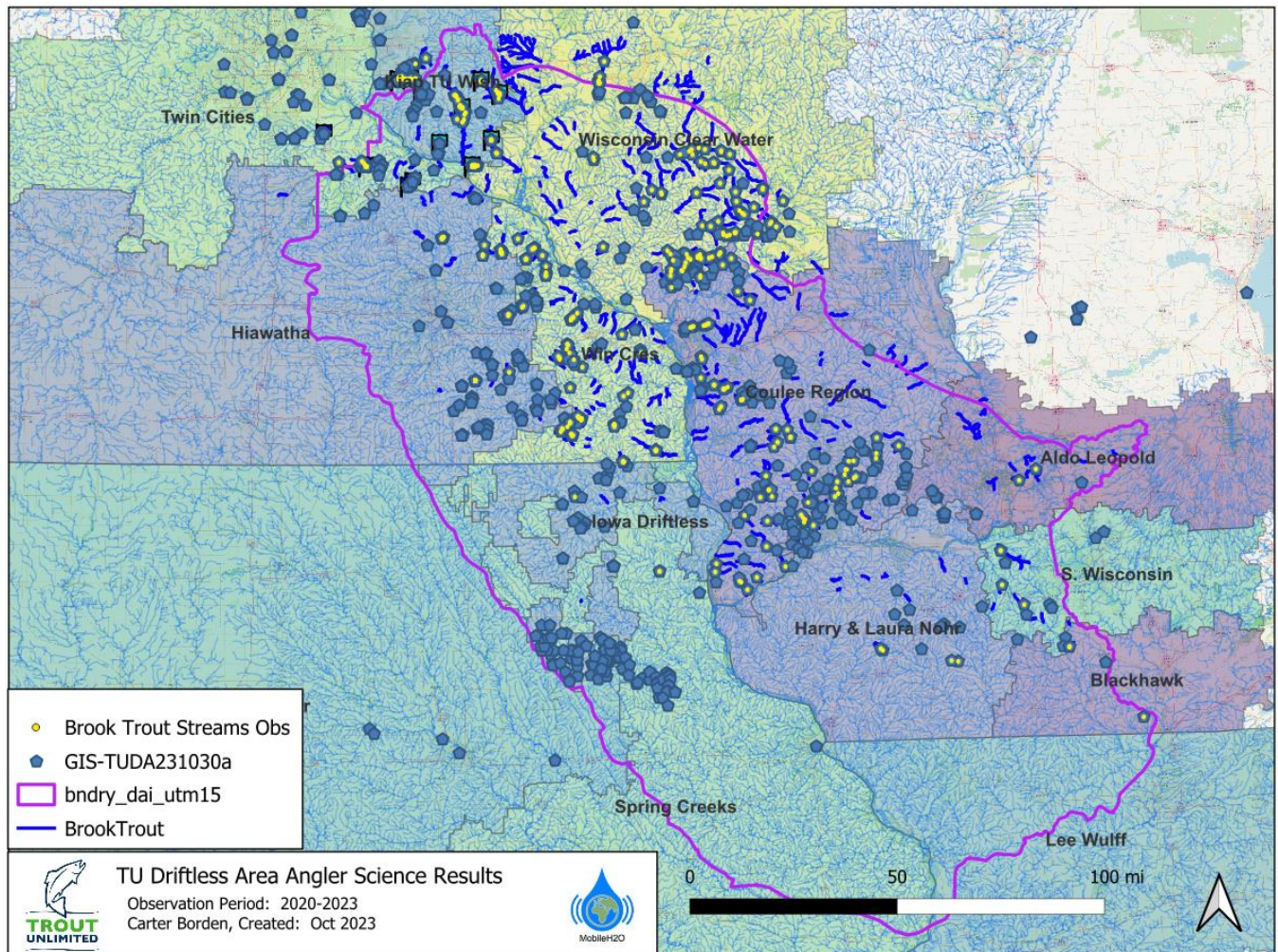


Figure 2. 2020 - 2023 TU Angler Science Program observations made in the Driftless Area, and the subset of observations made on brook trout streams.

Table 3. 2019 - 2023 WiseH2O App observers per year in the Driftless Area

Year	Active Observers	Change from Previous Year	New Observers	Change from Previous Year	Observations/Observer	Change from Previous Year
2019*	16	-	16	-	3.8	-
2020	28	98%	14	-13%	5.0	33%
2021	54	93%	43	207%	7.5	51%
2022	61	13%	33	-23%	7.5	0%
2023	80	31%	38	15%	9.7	29%

\*Large turnover between 2019 to 2020 likely due to the change of app download from manual to through the Play Store/Apple Store

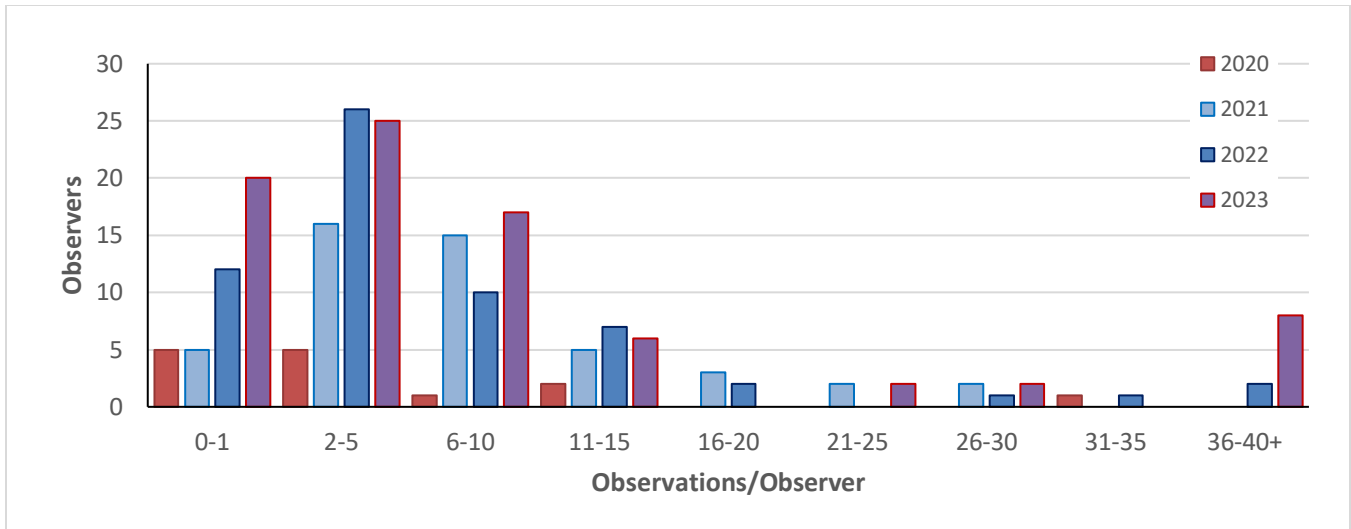


Figure 3. Frequency of observations per observer from the 2020 - 2023 TU Angler Science Program seasons

### TU Chapters, Agencies, Universities, and Other Organizations

Since 2020, the first year of program expansion to the entire Driftless Area, members associated with 10 of the 15 TU Chapters located in the Driftless Area have made 1028 observations (Table 4). Of note, during the 2021 - 2023 seasons, the **Kiap-TU-Wish**, **Twin Cities TU (TCTU)**, and **Hiawatha Chapters** fully embraced the program, setting up monitoring plans and organizing the involvement of 9+ members per chapter. Other participating chapters in the TU Angler Science Program include the Coulee Region, Oak Brook, Iowa Driftless, Southern Wisconsin, Wisconsin Clear Waters, and Win Cres TU Chapters. Additionally, participants affiliated with Minnesota DNR, Wisconsin DNR, USFWS, Saint Mary's University, Upper Iowa University, and Holeman Middle School have made 165 observations. In 2022 - 2023, the Kinni Corridor Collaborative employed the WiseH2O app to aid in monitoring the Powell Falls Dam Removal (168 observations), and in 2023, TU Science culvert inventory incorporated the app in its field effort (209 observations). Note, as the login to the WiseH2O app is anonymous, 19% of the 146 individuals who have made observations in the TU Dare have no TU Chapter or organizational affiliation, thus the members and associated observations per organization in Table 4 may be underrepresented.

Table 4. Number TU Chapters and organization members, and their observations, participating in the TU Angler Science Program in 2020 - 2023

Organizations	2020		2021		2022		2023	
	Members	Observations	Members	Observations	Members	Observations	Members	Observations
<b>TU Chapters</b>								
Aldo Leopold	0	0	0	0	0	0	0	0
Blackhawk	0	0	0	0	0	0	0	0
Coulee Region	0	0	1	8	0	0	0	0
Harry & Laura Nohr	0	0	0	0	0	0	0	0
Hiawatha	1	2	11	122	9	75	10	116
Iowa Driftless	1	1	1	3	1	1	5	8
Kiap-TU-Wish	20	91	13	105	9	59	9	50
Lee Wulff	0	0	0	0	0	0	0	0

Organizations	2020		2021		2022		2023	
	Members	Observations	Members	Observations	Members	Observations	Members	Observations
North Bear	0	0	0	0	0	0	0	0
Oak Brook	1	2	1	1	1	3	2	3
Southern Wisconsin	1	1	2	8	0	0	0	0
Spring Creeks	0	0	1	1	1	5	0	0
Twin Cities (TCTU)	1	4	17	119	19	107	19	92
Wisconsin Clear Waters	2	10	0	0	1	20	1	5
Win-Cres	1	6	0	0	0	0	0	0
Other								
TU Staff	1	1	0	0	2	15	7	253
Kinni Corridor Collaborative	0	0	0	0	3	122	4	46
Agency/University*	2	26	1	16	7	33	6	90
Unknown	0	0	5	18	8	19	16	86

\*Includes staff from Minnesota DNR, Wisconsin DNR, USFWS, Saint Mary's University, Upper Iowa University, Holmen Middle School

### WiseH2O App Test Kit Distribution

TU Chapters were not supplied with free WiseH2O App test kits in 2022 - 2023. In 2022, TU Chapters and individuals purchased the test kits through TU's Science Program at the MobileH2O website (<https://www.mobileh2o.com/shop>). In 2023, the test kits were distributed by Dan Dauwalter and Jean Barney of TU's Science Program.

### Education, Promotion, and Training

With the departure of Kent Johnson from the project after 2021, the TU Angler Science Driftless Area Program was promoted in 2022 - 2023 through presentations and workshops (including the 2022 Wild Trout Symposium and the 2022 and 2023 Driftless Area Symposiums), online presentations, announcements and articles on social media, the program website, 2022 - 2023 September Water Quality Sampling Blitzes, and email notifications (Table 5). In September 2023, a "September WiseH2O Water Quality Sampling Blitz" with an accompanying competition was organized, which yielded 121 observations from 34 individuals, 2 of whom made their first observation during the blitz. Prizes were randomly awarded to three of the 34 participants.

Table 5. 2020 - 2023 promotional activities for the TU Angler Science Driftless Area Program

Event	Media	Date
<b>2020</b>		
Monitoring Water Quality with the WiseH2O Mobile App: Trout Unlimited (Kiap-TU-Wish) Pilot Project	Webinar	Jan 16
Meeting with Minnesota and Wisconsin DNR Staff	Meeting	Feb 3
2020 Driftless Area Symposium	Presentation/Information Booth/Workshop	Feb 4-5
WiseH2O Training/Angler Science Program Overview	Webinar	May 26

Event	Media	Date
<b>2020</b>		
WiseH2O Training/Angler Science Program Overview	Webinar	Sep 10
American Fisheries Society Virtual Annual Meeting	Poster (Virtual)	Sep 14-25
<b>2021</b>		
Webinar on WiseH2O App, for 2021 Driftless Area Rollout	Webinar	Mar 31
WiseH2O App training session with Hiawatha Chapter	Training	Apr 3
WiseH2O App training session with TCTU Chapter	Training	Apr 27
September 2021 WiseH2O Water Quality Blitz	Email, website	Sept
2021 American Fisheries Society Annual Meeting	Poster	Nov 6
2021 Trout Unlimited Science Symposium (Virtual)	Poster	Dec 16
<b>2022</b>		
Driftless Area Symposium (Virtual)	Presentation	Mar 3
Social media posts (TU-Science, DARE)	Twitter, <a href="#">Instagram</a> , <a href="#">Facebook</a>	June, July, August, Sept
September 2022 WiseH2O Water Quality Blitz	Email, website, social media	Sept
Wild Trout Symposium	Poster	Sep 27-30
<b>2023</b>		
Driftless Area Symposium (Virtual)	Presentation	Mar 3
Upper Midwest Stream Restoration Symposium (La Crosse, WI)	Poster	Feb 26–Mar 1
Hiawatha Chapter of TU	Presentation	April 3
Wisconsin Trout Unlimited’s “Talking Trout” series	Presentation	April 5
Social media posts (TU-Science, DARE)	Twitter, <a href="#">Instagram</a> , <a href="#">Facebook</a>	June, July, August, Sept
September 2023 WiseH2O Water Quality Blitz	Email, website, social media	Sept

## WiseH2O App Technology Updates

For the 2023 season, the App itself only corrected errors. The primary technology updates were backend storage and recalibration of the colorimetric algorithm for NO<sub>3</sub>.

## Supporting Implementation Infrastructure and Services

The 2023 program effort primarily built upon and updated the supporting services developed in 2021-2022. Specifically, the following efforts were implemented:



1. Training materials were updated and expanded to support the use of the updated WiseH2O App. Training materials include a written user manual and an instructional video, allowing users to learn how to use the App via self-training. These documents can be found at <https://www.mobileh2o.com/mh2oapp>, and the written document is also available through a link on the WiseH2O App (Preferences=> Tutorials).
2. The introductory webpage that serves as the base landing website for information about the TU Angler Science Driftless Area Program (<https://www.mobileh2o.com/driftlessprogram>) was kept current (Figure 4).

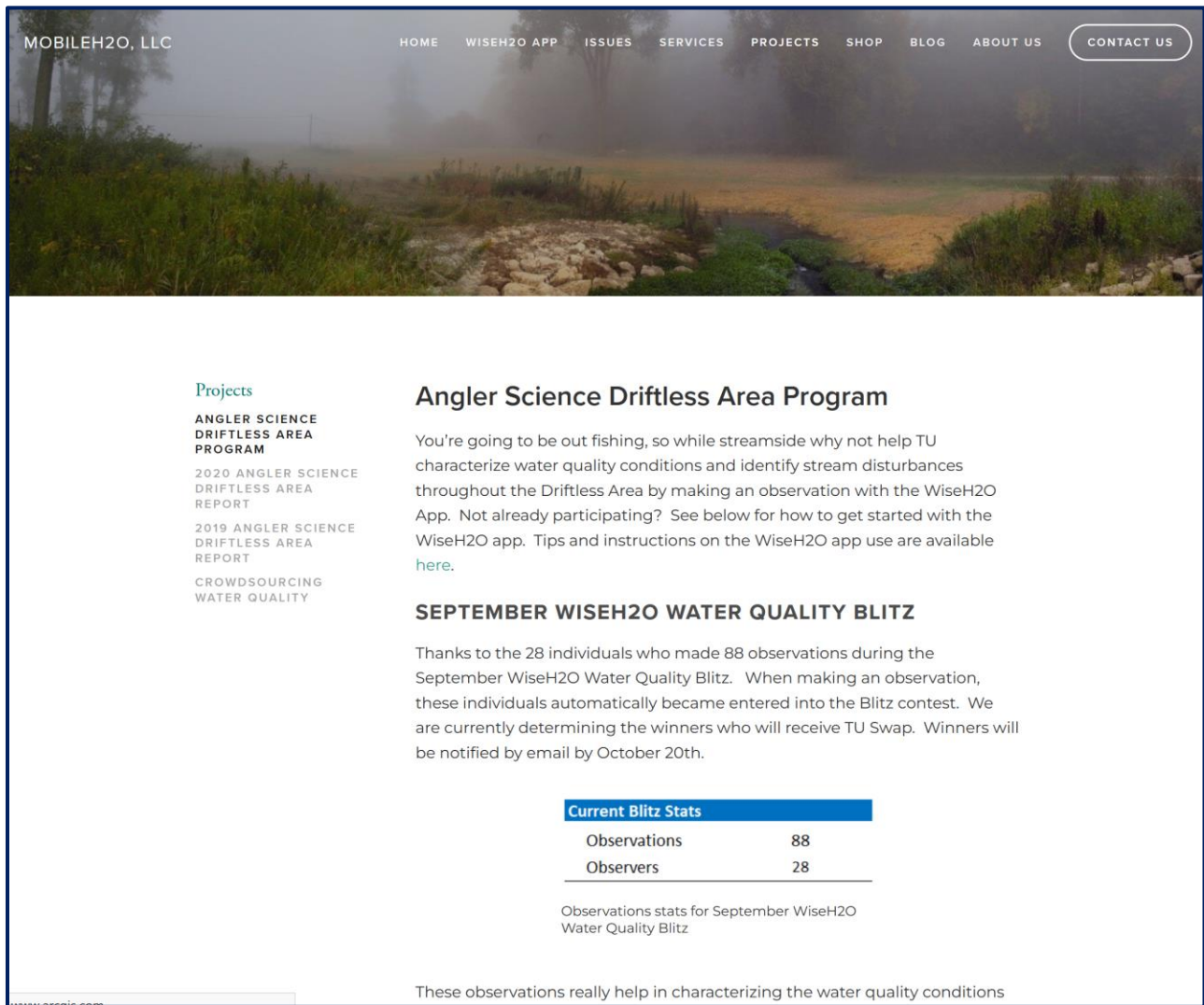


Figure 4. Webpage for the 2022 TU Angler Science Driftless Area Program.

## Driftless Area Scorecard

To promote water quality awareness, provide participating anglers with feedback on their efforts, and inform TU members of issues being addressed by TU Chapters, a Driftless Area Scorecard is being produced. The front page summarizes the conditions across the Driftless Area (Figure 5), based on fish health and habitat condition. The back page provides information on the specific water quality issues



(nutrients, water temperature, stream disturbances) and restoration potential within each chapter domain. Before the distribution of the 2023 Scorecard, the weighting of categories and messaging need to be further refined based on TU's guidance and preferences.

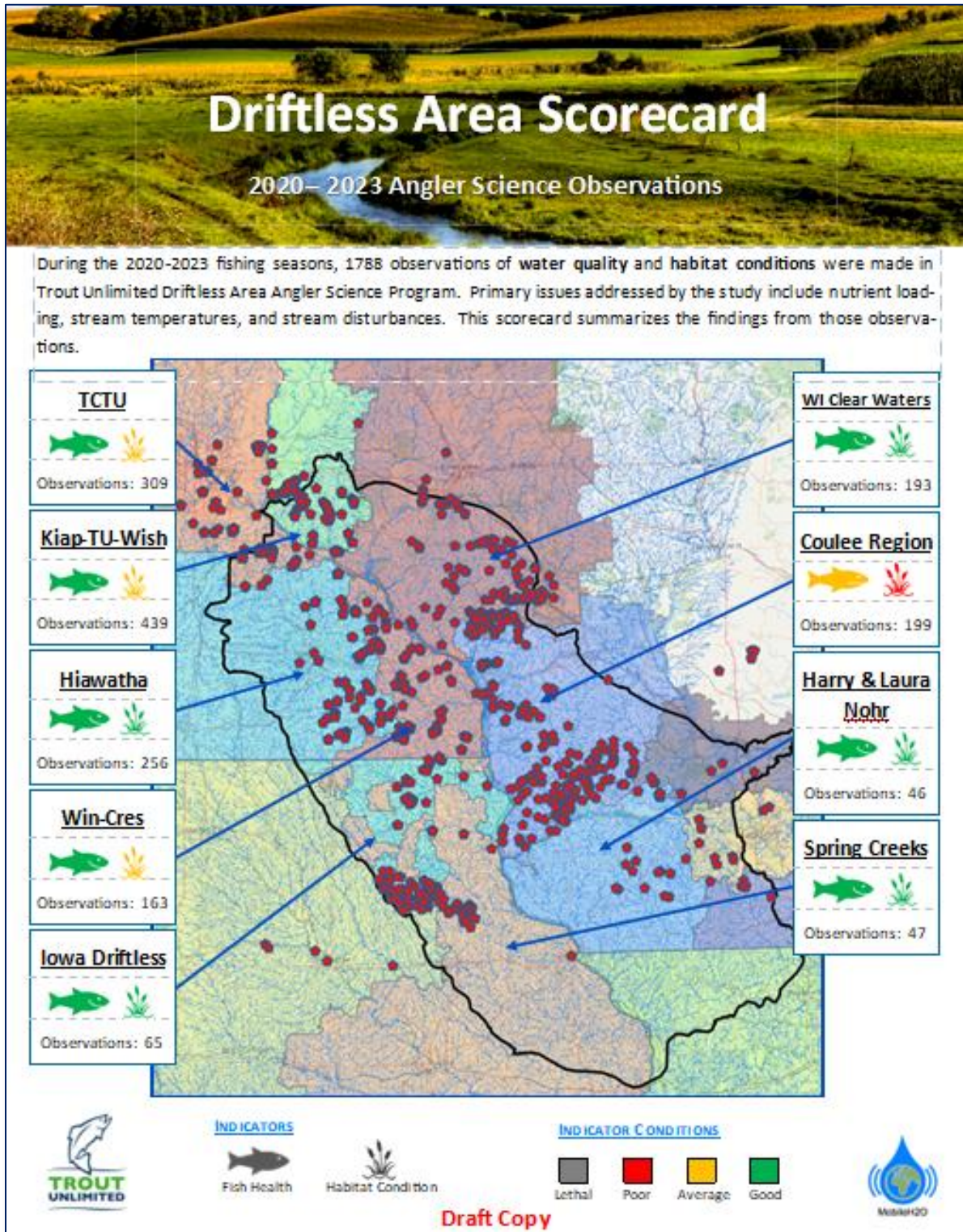


Figure 5. Front page of the TUDARE Driftless Area Scorecard, based on WiseH2O App data.

## ISSUES

DRIFTLESS AREA ISSUES	NUTRIENTS	WATER TEMPERATURE	STREAM DISTURBANCE	RESTORATION POTENTIAL
Kiap-TU-WISH				Channelized reaches had eroding banks and poor water temperatures. Excellent opportunity for stream restoration
TUTC				Excess nutrients: opportunity for developing nutrient BMPs including larger stream buffer zones. Channelized reaches offer excellent opportunity for stream restoration
Hiawatha				Stream conditions good.
WI. Clear Water				Temperature violation and migration barrier: Channelized reaches offer excellent opportunity for stream restoration
Win Cres				Excess nutrients observed in a stream. Opportunity for developing nutrient BMPs including larger stream buffer zones
Coulee Region				Fish kill from nutrient runoff: Opportunity for developing nutrient BMPs including larger stream buffer zones

Indicator Quality

Lethal  
 Poor  
 Average  
 Good

Observations

<30  
 30-100  
 >100

## ABOUT THE DATA

The assessment is based on 1788 observations made throughout the Driftless Area using the WiseH2O™ app. Observation information reported by the app includes alkalinity, hardness, nitrate, nitrite, orthophosphate, pH, water temperature and clarity, and stream disturbances. Information is posted to the cloud, allowing water quality screening data to be crowd-sourced across broad geographies to characterize regional water quality conditions, identify potential problem areas, and educate anglers and other users on water quality. The data is reported on the project website at <https://www.mobileh2o.com/driftlessprogram> with an annual report posted in December.

## GET INVOLVED

You're going to be out fishing, so while streamside why not help TU characterize water quality conditions and identify stream disturbances throughout the Driftless Area by making an observation with the WiseH2O App. Not already participating? Visit the project page on the MobileH2O website to find out more: <https://www.mobileh2o.com/driftlessprogram>. Or contact Dan Dauwalter ([Daniel.Dauwalter@tu.org](mailto:Daniel.Dauwalter@tu.org)) or Carter Borden ([carter@mobileh2o.com](mailto:carter@mobileh2o.com)).

## SPONSORS

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Figure 6. Back page of the TUDARE Driftless Area Scorecard, based on WiseH2O App data.