



March 20, 2022

To: Jeff Hastings

From: Carter Borden, Kent Johnson, Dan Dauwalter

Regarding: TU Angler Science Activities in 2020-2021: 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, WI in 2019, the Trout Unlimited (TU) Angler Science Program with the WiseH2O App expanded to the entire Driftless Area in 2020 and 2021. 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 Activities Report provides an overview of the program's activities and effectiveness at collecting data and engaging anglers and TU Chapters towards the goal.

WiseH2O App Observations Made

Since the program's inception in 2019, 607 observations have been made in the Driftless Area using the WiseH2O App. During the 2020/2021 seasons, this number was 547 (Table 1), which are primarily located in the northern half of the Driftless Area (Figure 1). Of the 403 observations made in 2021, 88 occurred during the "September Sampling Blitz" contest used to effectively encourage participants to make observations during the last part of the fishing season (see below).

Table 1. 2019-2021 WiseH2O App observations and the associated data reported

Year	Observations	Water Source	5n1 Test Strip	2n1 Test Strip	Phosphorus Test Strip	Stream Temp.	Stream Disturbances	Current Conditions
2019*	60	60	4	0	41	41	56	46
2020	144	118	108	92	84	95	103	115
2021	403	378	357	305	321	300	278	334
Total 2020-2021	547	496	465	397	405	395	381	449
Percentage 2020-2021	-	91%	85%	73%	74%	72%	70%	82%

*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, 2n1 test strip, phosphorus test strip, stream temperatures, stream disturbances (present/absent), and current stream and recent weather conditions (Table 1). During the 2020-2021 seasons, anglers consistently reported most data types, with the lowest category being stream

temperature at 70%. The high use percentages indicate that the users found the app easy to use for reporting all data types.

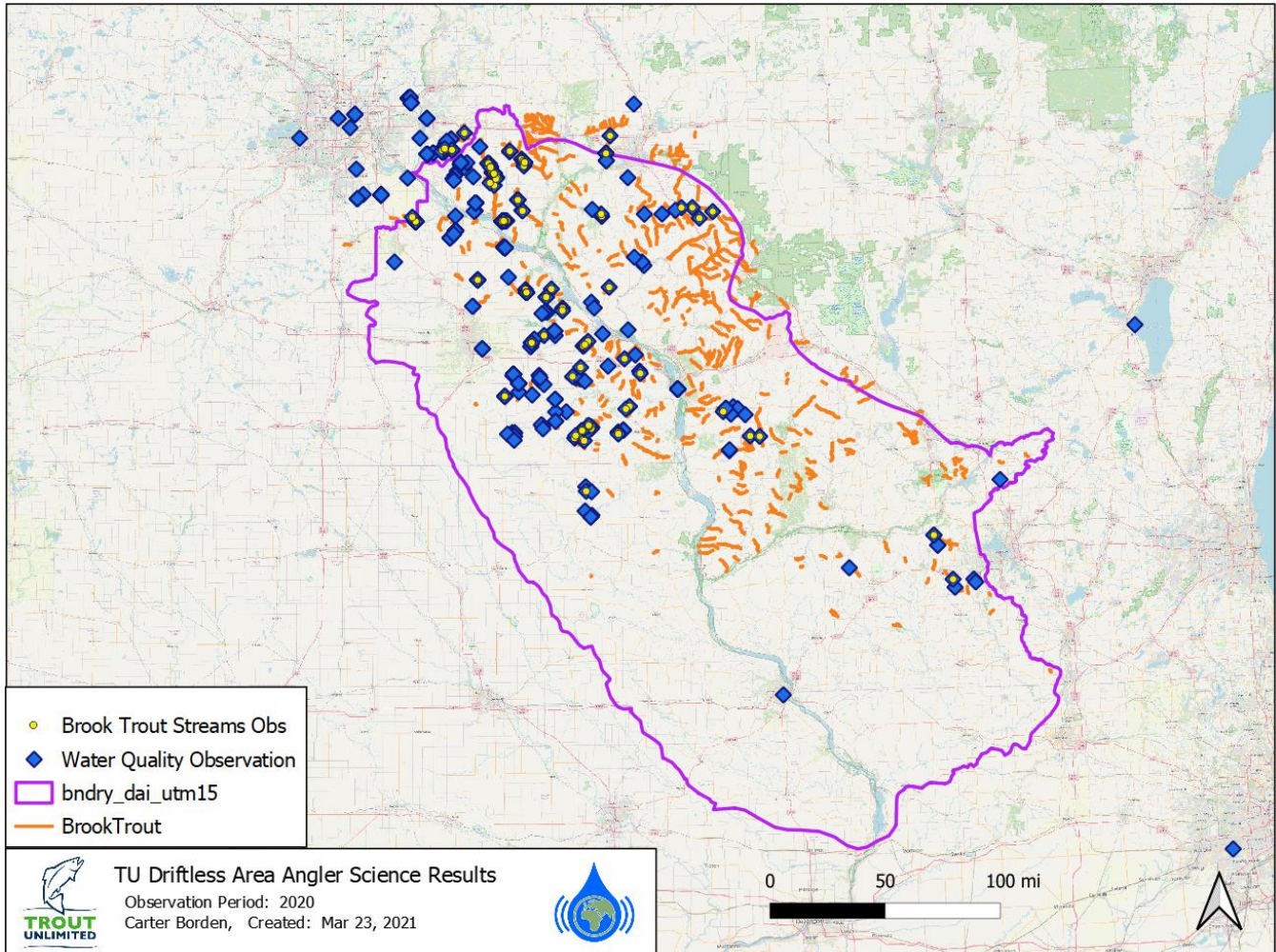


Figure 1. 2020-/2021 TU Angler Science Program observations made in the Driftless Area, and the subset of observations made on brook trout streams.

Trout Streams/Brook Trout Streams

With Brook Trout being the only native trout in the Driftless Area, conservation of this species and protection and restoration of streams that support them is a high priority for Trout Unlimited and TUDARE. In 2020-2021, WiseH2O App users were encouraged to make observations on Driftless Area Brook Trout streams, to better characterize their water quality and habitat. Of the 547 observations submitted in the 2020-2021 seasons, 521 (95%) have been on trout streams and 231 (42%) have been on brook trout streams (Figure 1).

WiseH2O App Observer Participation

Since the beginning of the Angler Science Driftless Area Program in 2019, 102 unique observers have participated, with 86 unique observer IDs (given when users first log into the app) making observations in 2020-2021 (Table 2). The number of observers has increased each year since the program inception, with

53 active observers submitting observations in 2021. In 2021, 42 new observers joined the program, likely due to a concerted effort to include new TU chapters.

Table 2. 2019-2021 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	33	106%	30*	88%	4.4	16%
2021	53	61%	42	40%	7.6	74%

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

In addition to gaining observers, each observer (on average) submitted more observations in 2020-2021 indicating greater involvement with the program. In 2020 observers collected 4.4 observations/observer (Table 2), with most collecting under 5 observations throughout the season (Figure 2, Table 2). In 2021, the average increased to 7.6 observations/observer, with many more observers making up to 10 observations and several dedicated individuals making 26-30 observations during the season.

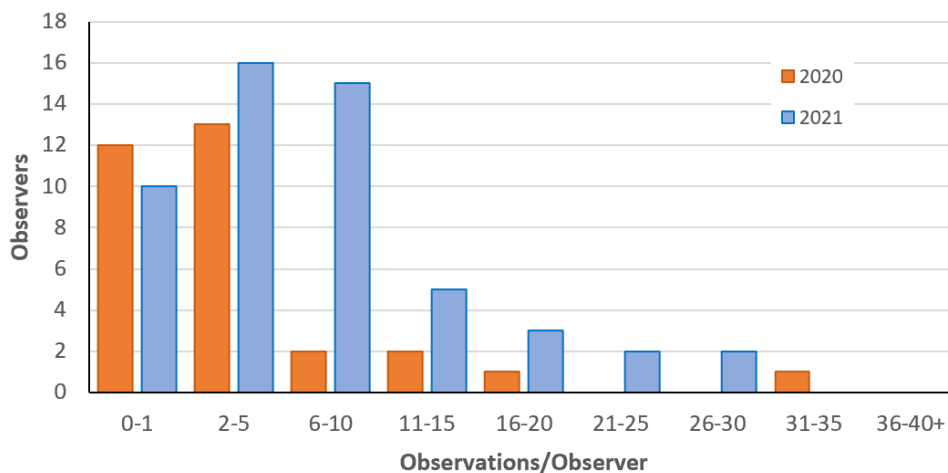


Figure 2. Frequency of observations per observer from the 2020/2021 TU Angler Science Program seasons

TU Chapters and Other Organizations

In the 2019 WiseH2O App pilot project, the Kiap-TU-Wish TU Chapter had 16 observers who submitted 82 observations¹. During the 2020-2021 seasons, 9 of 15 TU Driftless Area chapters participated in the program, including the Kiap-TU-Wish Chapter. Table 3 shows these participating chapters, including the annual numbers of observers and observations by each chapter. Of note, during the 2021 season, the **Kiap-TU-Wish**, **Twin Cities TU (TCTU)**, and **Hiawatha Chapters** fully embraced the program, setting up

¹ 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.

monitoring plans and organizing the involvement of 10+ members per chapter. Table 4 lists the number of observations made at each designated monitoring site per year by the Kiap-TU-Wish and TCTU Chapters. The Hiawatha Chapter's monitoring network is not reported here, as it is currently not specified in the WiseH2O App. These 3 TU chapters are role models for how to get members involved and target observations to trout streams that are important for each chapter to better understand.

Table 3. TU Chapter participating in the TU Angler Science Program seasons in the 2020-2021

Organizations	2020		2021	
	Observers	Observations	Observers	Observations
TU Chapters				
Coulee Region	0	0	1	8
Hiawatha	1	2	10	118
Iowa Driftless	1	1	0	0
Kiap-TU-Wish	19	90	11	97
Oak Brook	1	2	1	1
Southern Wisconsin	0	0	1	1
Twin Cities (TCTU)	1	4	15	118
Wisconsin Clear Waters	2	10	0	0
Win-Cres	1	6	0	0
Other				
Other/Unknown Affiliations*	5	29	14	60

*Includes staff from Minnesota DNR, Wisconsin DNR, and USFWS

Table 4. Designated TU chapter monitoring sites sampled in 2020-2021

Monitoring Location	2019	2020	2021	Total
Kiap-TU-Wish				
Cady Creek @ 50th St	0	2	6	8
Eau Galle River @ WI Hwy 29	0	0	1	1
Isabelle Creek @ County Rd EE	1	1	7	9
Kinnickinnic River, Lower Glen Park	4	4	9	17
Pine Creek @ County Rd AA	6	7	9	22
Rocky Branch Creek, Lower Glen Park	4	1	3	8
Rush River @ 570th Ave	0	12	6	18
SF Kinnickinnic River @ 900th St	1	0	4	5
Trimbelle River @ County Rd W	7	5	4	16
Total	23	32	49	104
Twin Cities Trout Unlimited				
Hay Creek, 320th St	-	-	1	1
Hay Creek, 325th St	-	-	1	1
Trout Brook	-	-	25	25
Vermillion River, South Branch	-	-	7	7
Total			34	34



WiseH2O App Test Kit Distribution

With support provided by TU's Coldwater Conservation Fund (CCF), 62 Basic Test Kits and 43 Premium Test Kits were distributed free-of-charge to 12 (of 15) Driftless Area TU chapters, the IA, MN, and WI Departments of Natural Resources, the US Fish and Wildlife Service, and TUDARE staff (Table 5). At year-end 2021, 14 free Basic Test Kits remain in inventory. Via the MobileH2O website, an online store was also established in 2020, to allow users to purchase additional test kits and support wider distribution (<https://www.mobileh2o.com/shop>).

Table 5. TU chapters and agencies receiving free WiseH2O App test kits via the TU Coldwater Conservation Fund

Organization	Available		Distributed 2020-2021			
	Basic Kits ^a	Premium Kits ^b		Basic Kits ^a	Premium Kits ^b	
<i>TU Chapters</i>						
Kiap-TU-Wish	5	3	✓	10	✓	4
Clear Waters	5	3	✓	2	✓	1
Coulee	5	3	✓	5	✓	3
Nohr	5	3				
Southern Wisconsin	5	3	✓	5	✓	3
Blackhawk	5	3				
Leopold	5	3				
Win-Cres	5	3	✓	5	✓	3
Hiawatha	5	3	✓	5	✓	3
Twin Cities	5	3	✓	5	✓	3
Spring Creeks	5	3	✓	5	✓	3
Iowa Driftless	5	3	✓	5	✓	3
North Bear	5	3	✓	5	✓	3
Oak Brook	5	3	✓	5	✓	3
Lee Wulff	5	3	✓	5	✓	3
<i>Agencies</i>						
Iowa DNR			✓			1
Minnesota DNR		2	✓			1
Wisconsin DNR		2	✓			1
USFWS		2				2

^aBasic Kits: 5 x 5n1 strip (alkalinity, hardness, pH), 5 x 2n1 strip (nitrate, nitrite)

^bPremium Kits: 25 x 5n1 strip (alkalinity, hardness, pH), 25 x 2n1 strip (nitrate, nitrite), 25 orthophosphate

Education, Promotion, and Training

The TU Angler Science Driftless Area was promoted through direct contact with key TU Chapters and agency stakeholders and more generally by presentations and workshops (including the 2020 Driftless Area Symposium), online presentations, announcements and articles on social media, the Program website, and email notifications (Table 6). In addition, Kent Johnson, Carter Borden, and Dan Dauwalter fielded questions from emails and phone calls about the program and technology throughout 2020-2021. Finally, in September 2021, a "sampling blitz" with an accompanying competition was organized which yielded 88 observations from 28 individuals, 6 of whom were new to the program.

Table 6. 2020-2021 promotional activities for the TU Angler Science Driftless Area Program

Event	Media	Date
2020		
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
WiseH2O Training/Angler Science Program Overview	Webinar	Sep 10
American Fisheries Society Virtual Annual Meeting	Poster (Virtual)	Sep 14-25
2021		
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

WiseH2O App Technology Updates

Numerous upgrades to the WiseH2O App technology occurred in 2020-2021, and the supporting implementation infrastructure and services allowed for efficient expansion of the program.

WiseH2O Mobile Application (mApp) Updates

During Spring 2020, major improvements to the mApp increased access, performance, and educational experience for the users. These improvements included:

1. Upon first login by new users, welcome screens now introduce the mApp's purpose and call to action (Figure 3).

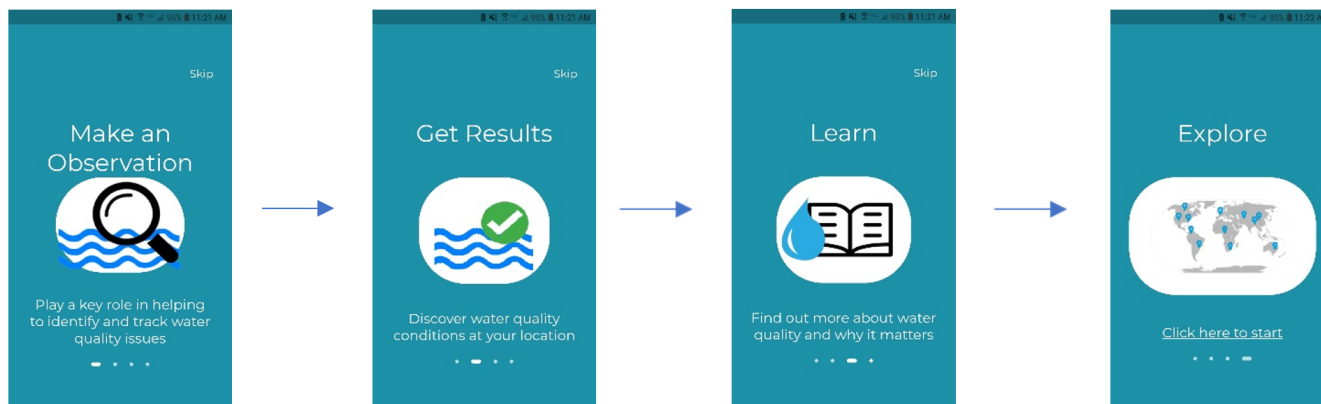


Figure 3. Welcome screens for the WiseH2O mApp.

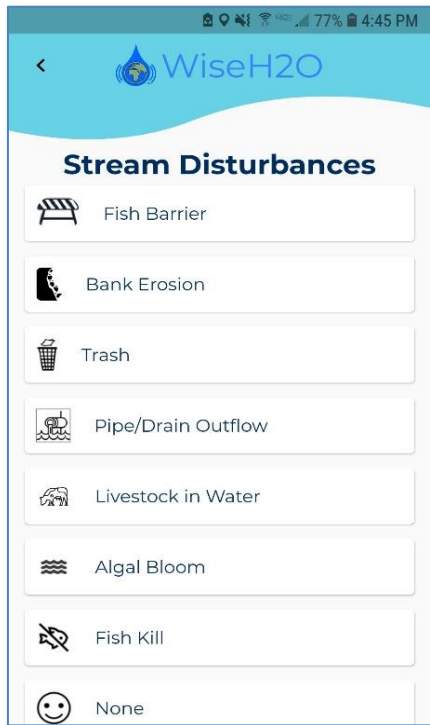


Figure 4. Stream disturbances page in the WiseH2O mApp

2. iPhone: image capture issues with the 5n1 and 2n1 test strips were fixed. Lingering difficulties in consistently capturing the test strip/calibration card image were fixed, making the system reliable.
3. Stream disturbances have been expanded to include "Algal Bloom", "Fish Kill", and "Livestock in Water" (Figure 4).
4. Results bars and educational information were added for alkalinity, hardness, nitrate, nitrite, pH, orthophosphate, and water temperature. Presenting the results on color bars relating to values educates users on how the result impacts fish health. Furthermore, for users who want to learn more, tapping on the results bar for an analyte leads to information pages on fish and habitat health over a range of analyte values, as well as an educational page providing greater insight on the information (Figure 5).
5. Links to training materials. When in range of cell phone or internet connection, users can view the training materials posted on the MobileH2O website (<https://www.mobileh2o.com/mh2oapp>).
6. Choice of monitoring networks. In 2020, only the Kiap-TU-Wish Chapter had an established monitoring network. In 2021, the Twin Cities TU Chapter also developed a monitoring network. As more TU chapters and organizations develop monitoring networks, the mApp allows for the introduction of new monitoring sites, thereby enabling users to choose which network to display and select monitoring sites.

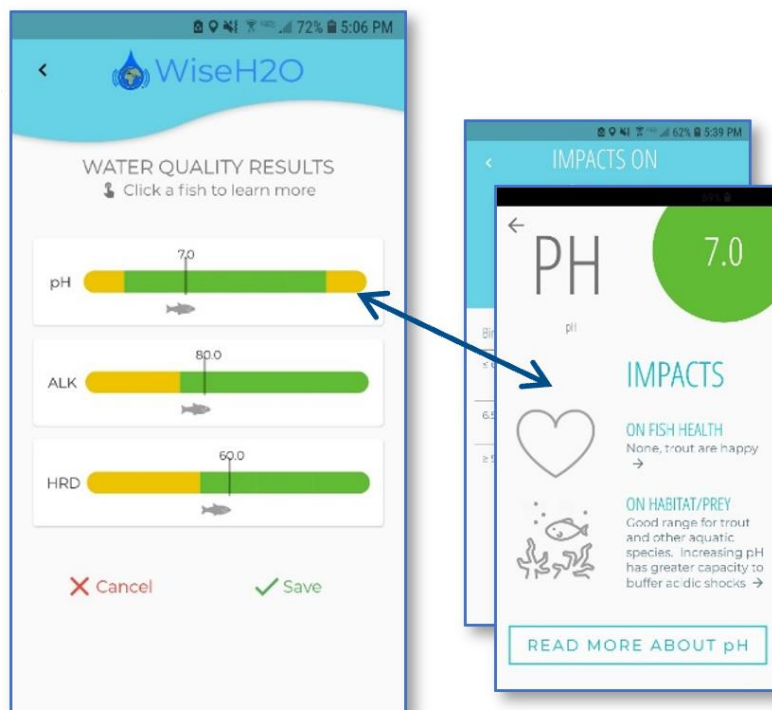


Figure 5. WiseH2O mApp results page and accompanying analyte educational pages

Supporting Implementation Infrastructure and Services

In 2019 and the beginning of 2020, a TU member, agency staff, or other interested people would have to contact TU or MobileH2O to get involved with or become informed about the Angler Science Program. To support the expansion of the Program, the following efforts were implemented:

1. The mApp is available for free on the Apple Store (iPhone) and the Play Store (Android). Placing the mApp in these stores allows anyone with an iPhone (OS 6 or newer) or Android (OS 6 or newer) to install and use the mApp, avoiding the need for installation files for the Android and use of the Testflight App on the iPhone, which requires permission from an Apple account. It also allows for updates to be downloaded directly by users when made available.
2. Training materials were updated and expanded to support the use of the updated WiseH2O mApp. 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 mApp (Preferences=> Tutorials).
3. An introductory webpage was created as a base landing for information about the Angler Science Driftless Area Program (<https://www.mobileh2o.com/driftlessprogram>) (Figure 6). In 2021 this webpage was periodically updated to include overall monitoring progress.
4. To get interested parties started, the document "*Monitoring Driftless Area Trout Streams with the WiseH2O Mobile Application - Get Started: A Guide for Participants*" provides a brief background on the program, a road map for organizations and individuals to get started, and guidance on developing a monitoring plan. A link to the document is on the Angler Science Driftless Area Program webpage.
5. The 2019 and 2020 Angler Science Driftless Area Program monitoring results and reports are presented on a separate webpage: <https://www.mobileh2o.com/anglerscience> (Figure 7, Figure 8).
6. To assist with monitoring plan development, the Kiap-TU-Wish Chapter's monitoring plan is posted on the 2019 Angler Science webpage. The Kiap-TU-Wish plan provides a template that can be used by other TU Chapters and organizations to develop their own monitoring plans. These documents, along with a description of the project, are available for download on the Program website: <https://www.mobileh2o.com/anglerscience> (Figure 7).
7. To distribute test kits to interested organizations and individuals, an online store was established, allowing for the direct purchase of test kits: <https://www.mobileh2o.com/shop>. See description above (Page 5).

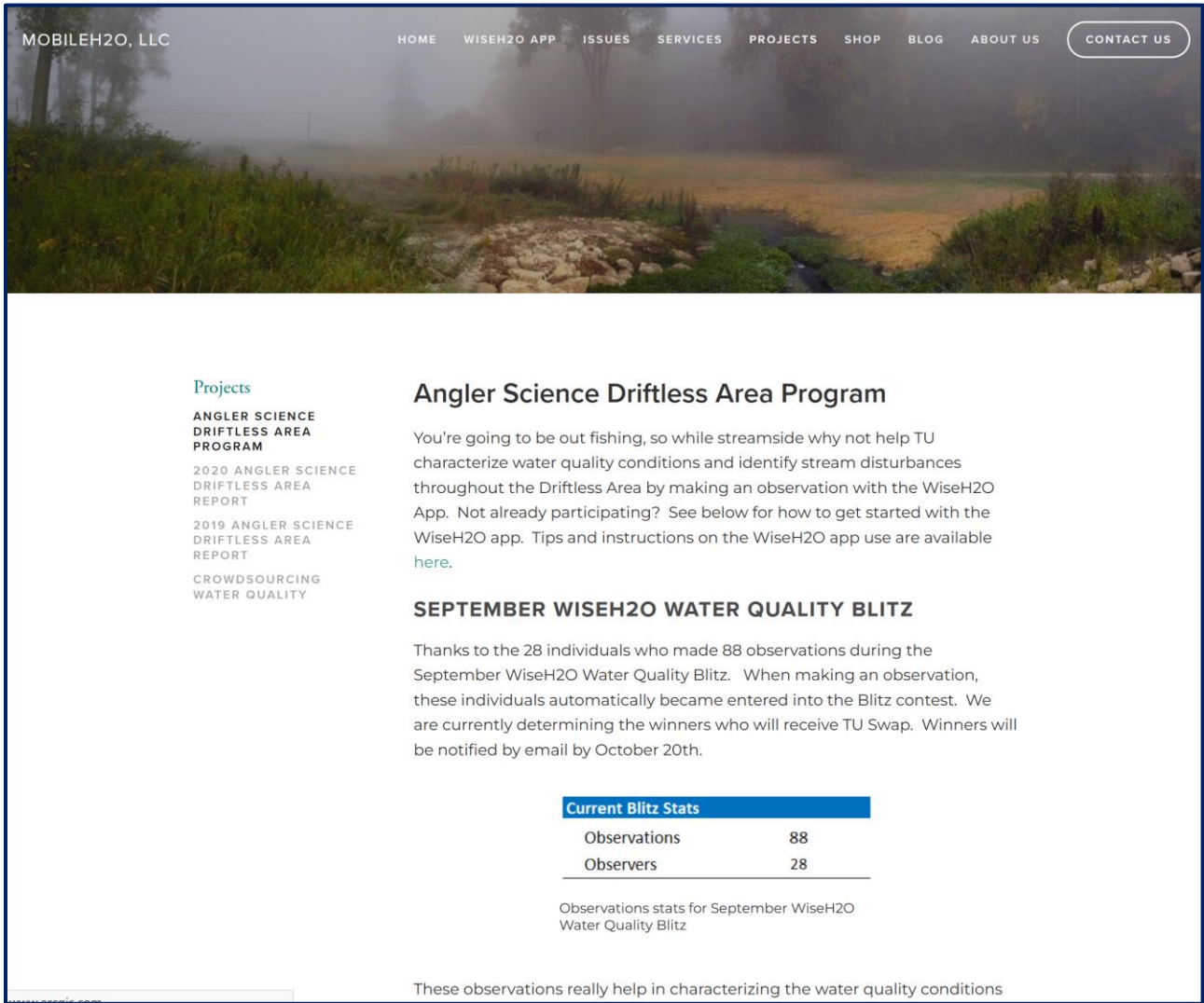


Figure 6. Webpage for the 2020-2021 Angler Science Driftless Area Program

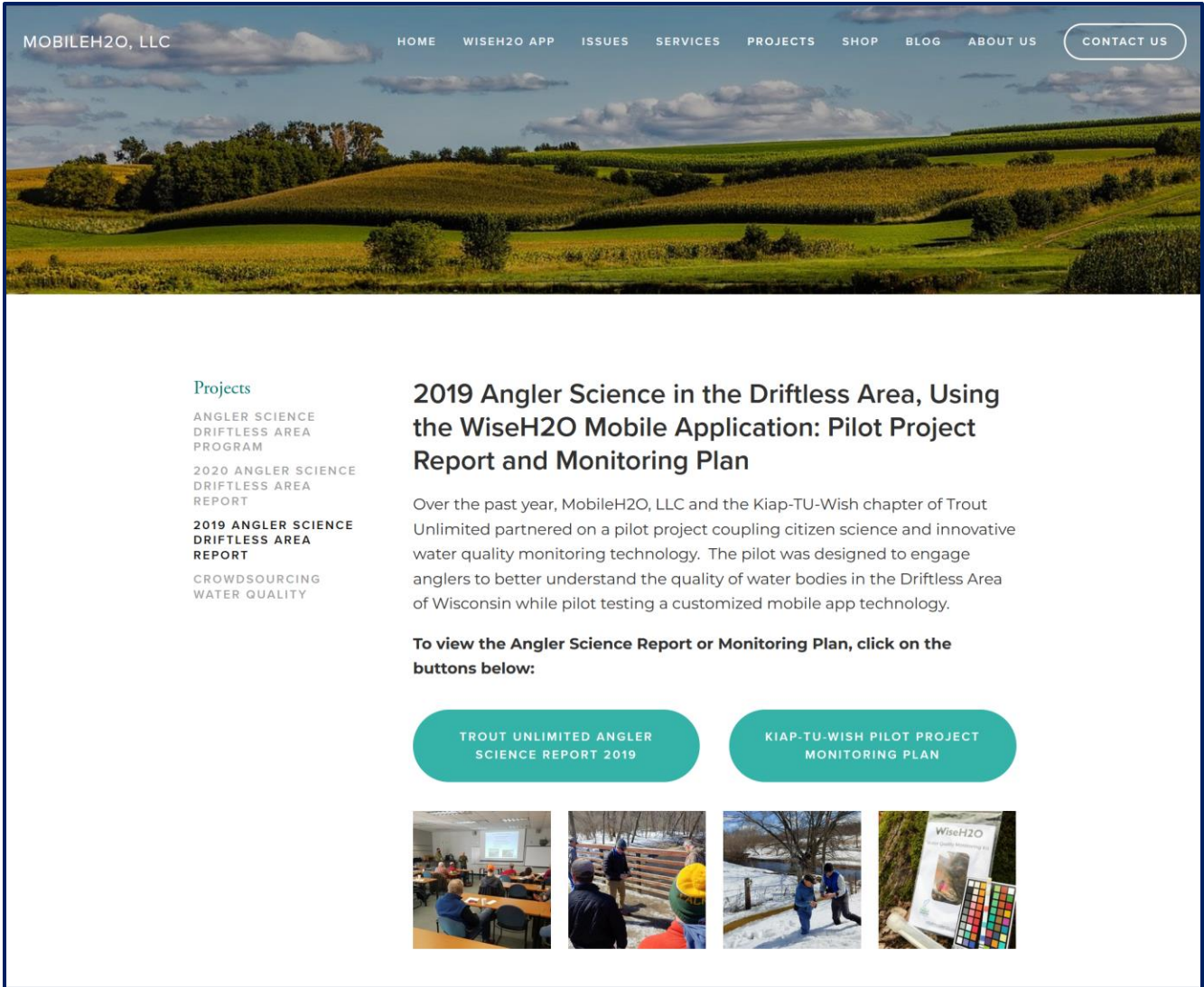


Figure 7. 2019 Pilot TU Angler Science Program webpage

Projects

ANGLER SCIENCE
DRIFTLESS AREA
PROGRAM

**2020 ANGLER SCIENCE
DRIFTLESS AREA
REPORT**

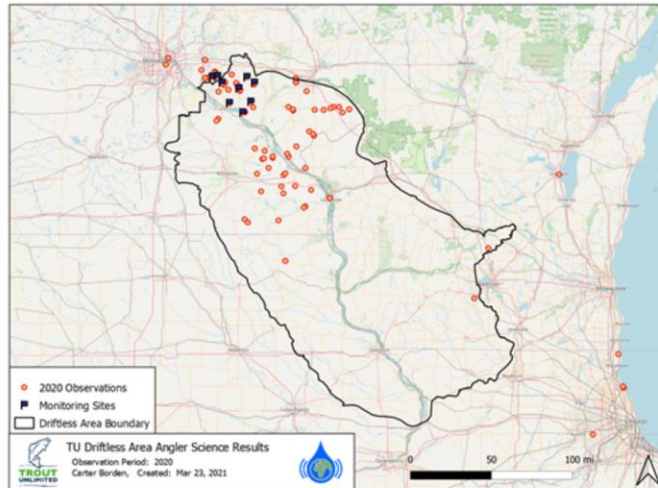
2019 ANGLER SCIENCE
DRIFTLESS AREA
REPORT

CROWDSOURCING
WATER QUALITY

2020 Angler Science Driftless Area Report

Ambitious intentions for expansion of the Trout Unlimited (TU) Angler Science Driftless Area Program in 2020 were greatly hampered by the COVID-19 pandemic. In 2020, the Program was intended to expand from Pierce County (WI), monitored by the TU Kiap-TU-Wish Chapter in 2019, to the other 14 TU Chapters, US Fish and Wildlife (US FWS) staff, and Minnesota and Wisconsin Departments of Natural Resources (DNR) staff with regions active in the Driftless Area. Though hindered by COVID-19, in 2020 the program advanced by:

- 144 observations were still made in the Driftless Area (see map below)



Observation locations made throughout the Driftless Area in 2020

Figure 8. 2020 TU Angler Science Program webpage