Lori Rowe

From: PUBCOMMENT-OCC
Sent: Tuesday, April 12, 2022 11:52 AM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: Public comment on Permit Number WQ0015918001

From: jadkins@gbra.org <jadkins@gbra.org>
Sent: Monday, April 11, 2022 7:38 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number WQ0015918001

REGULATED ENTY NAME COTTON CENTER MARTINDALE WWTP

RN NUMBER: RN111097283

PERMIT NUMBER: WQ0015918001

DOCKET NUMBER:

COUNTY: CALDWELL

PRINCIPAL NAME: WALTON TEXAS LP

CN NUMBER: CN604017491

FROM

NAME: Justin Adkins

EMAIL: jadkins@gbra.org

COMPANY: Guadalupe-Blanco River Authority

ADDRESS: 933 E COURT ST
SEGUIN TX 78155-5819

PHONE: 8303795822

FAX:

COMMENTS: I would like to know if the Applicant is aware of the timeline for any incoming housing/property development which will be served by the plant. Thank you.

Lori Rowe

From: PUBCOMMENT-OCC
Sent: Thursday, November 4, 2021 9:29 AM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: Public comment on Permit Number WQ0015918001
Attachments: Walton WWTP email 1 & 2 - FFEMA Flood Map Service Center _ 97.836943, 29.84999.pdf

MWD
122210

From: janable@martindale.texas.gov <janable@martindale.texas.gov>
Sent: Wednesday, November 3, 2021 2:46 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number WQ0015918001

REGULATED ENTY NAME COTTON CENTER MARTINDALE WWTP

RN NUMBER: RN111097283

PERMIT NUMBER: WQ0015918001

DOCKET NUMBER:

COUNTY: CALDWELL

PRINCIPAL NAME: WALTON TEXAS LP

CN NUMBER: CN604017491

FROM

NAME: Jared Anable

E-MAIL: janable@martindale.texas.gov

COMPANY: City of Martindale

ADDRESS: PO BOX 365
MARTINDALE TX 78655-0365

PHONE: 5123572639

FAX: 5123575826

COMMENTS: The City of Martindale requests TCEQ reject the application in its current form based on the following considerations: 1) The application contains grave errors regarding the discharge limits of the plant, which if not corrected poses a hazard to the safety and welfare of the environment, humans, and endangered species and violates

the long standing development agreement contract between the developer and the City of Martindale. The discharge limits set by the development agreement are Five (5) milligrams per liter of Biochemical Oxygen Demand, Five (5) milligrams per liter of total suspended solids, Two (2) milligrams per liter of ammonia nitrogen, One (1.0) milligrams per liter of phosphorus. Representatives of the developer have confirmed that the discharge limits included in the permit application states that the plant is designed for much higher and more harmful permit limits and that the application contains errors through out the document (see Walton WWTP email 2 attached) The developer acknowledged the errors in their application as early as January (see Walton WWTP email 1 attached) and has maintained since then that they will file a corrected application, which they have failed to do so to this point. The City of Martindale has recently passed a resolution regarding the discharge limits to be set at Five (5) milligrams per liter of Biochemical Oxygen Demand, Five (5) milligrams per liter of total suspended solids, Two (2) milligrams per liter of ammonia nitrogen, One Half (0.5) milligrams per liter of phosphorus for all developments. 2) The City of Martindale is concerned that the wastewater plant may contaminate one or more wells used as sources for drinking water based on conversations with the Martindale Water Supply Corporation 3) The City of Martindale is engaged in considering the development of a regional wastewater facility that would limit the number of facilities discharging wastewater into the river system and accommodate future demand for growth. A regional approach is a preferred option compared to a patchwork of independent treatment facilities. If a patchwork approach is approved by TCEQ, the City of Martindale requests that all independent treatment facilities commit to 75% reuse of the treated water. 4) The City of Martindale is concerned that the wastewater plant application does not contain sufficient provisions to prevent adverse impacts to water quality from contamination due to flooding (See attached flood map).

[EMAIL 1]

Zimbra **janable@martindale.texas.gov**

Re: Walton Cotton Center WWTP Notice

From : Thomas Rhodes <thomas@tkarcres.com> Fri, Jan 29, 2021 07:55 AM
Subject : Re: Walton Cotton Center WWTP Notice 2 attachments
To : Robert Deviney <rdeviney@martindale.texas.gov>
Cc : Jared Anable <janable@martindale.texas.gov>, Sylvia Gomez <sgomez@martindale.texas.gov>, Lisa Shell Allen <lsa@martindale.texas.gov>, Jason Cooper <JCooper@walton.com>

External images are not displayed. Display images below

Mayor Deviney,

Thank you for reviewing and keeping us informed on the City's review. I followed up with our engineer on the items you identified.

Attached is the public notice verification form that was submitted to TCEQ along with the required newspaper notice affidavits, etc. That should sufficiently address everything related to the public notice.

Our engineer went back and reviewed the application and it appears to meet the 5-5-2-1 discharge requirements. There were 2 pages that had errors but will be corrected and submitted once TCEQ assigns the technical reviewer and we receive notice.

As an additional note, the original Cotton Center Development Agreement required that any discharge permit meet the TCEQ standards for a 5-5-2-1 and we will ensure that we do so.

Please let me know if you have any other questions or need any additional information at this time.

Thanks,

Thomas

From: Robert Deviney <rdeviney@martindale.texas.gov>
Date: Monday, January 25, 2021 at 12:21 PM
To: Thomas Rhodes <thomas@tkarcres.com>
Cc: Jared Anable <janable@martindale.texas.gov>, Sylvia Gomez <sgomez@martindale.texas.gov>, Lisa Shell Allen <lsa@martindale.texas.gov>
Subject: Re: Walton Cotton Center WWTP Notice

The city of Martindale received a copy of the permit today, 1/25/2021. It has been made available for viewing at City Hall. In the packet of information you emailed earlier this month there is a form called "Public Notice Verification Form" that needs to be filled out by the applicant. It asks for the "Public Place" and "Address of the Public Place". Those should be "City of Martindale City Hall" and "409 Main Street, Martindale, Texas 78655" respectively.

It appears to me that all communications with the TCEQ needs to be from the applicant so we are providing this information but don't think we should be the entity to submit forms to the TCEQ. If you need us to assist further please let us know.

Also, attached is a resolution the City Council passed in 2019 concerning minimum discharge limits for wastewater treatment plants in the local area. The permit you have submitted does not meet those recomendations. I am sure this will be questioned by our local citizens. I provide this information just so you are aware.

Good luck and I am glad to see that the Walton development is moving forward.

ROB DEVINEY

From: "Thomas K. Rhodes" <thomas@tkarcres.com>
To: "Rob Deviney" <rdeviney@martindale.texas.gov>
Cc: "Jared Anable" <janable@martindale.texas.gov>, "Sylvia Gomez" <sgomez@martindale.texas.gov>, "Lisa Shell Allen" <lsa@martindale.texas.gov>
Sent: Monday, January 11, 2021 12:37:28 PM
Subject: Re: Walton Cotton Center WWTP Notice

Thank you. And that is correct. They will not be executed until we provide full copy of the permit. I have requested that from the engineers as well.

Thanks again,

Thomas

From: Robert Deviney <rdeviney@martindale.texas.gov>
Date: Monday, January 11, 2021 at 12:24 PM
To: Thomas Rhodes <thomas@tkarcres.com>
Cc: Jared Anable <janable@martindale.texas.gov>, Sylvia Gomez <sgomez@martindale.texas.gov>, Lisa Shell Allen <lsa@martindale.texas.gov>
Subject: Re: Walton Cotton Center WWTP Notice

We can print these but we can't sign them until you provide a copy of the permit for public viewing.

ROB DEVINEY

From: "Thomas K. Rhodes" <thomas@tkarcres.com>

To: "Jared Anable" <janable@martindale.texas.gov>

Cc: "Sylvia Gomez" <sgomez@martindale.texas.gov>, "Lisa Shell Allen" <lsa@martindale.texas.gov>, "Rob Deviney" <rdeviney@martindale.texas.gov>

Sent: Monday, January 11, 2021 10:25:13 AM
Subject: Re: Walton Cotton Center WWTP Notice

Mr. Anable,

Please see attached provided from AUC Group, the engineering firm handling the permitting with TCEQ on behalf of Walton. It is 15 pages on 8.5" X 11". Let me know if I need to print and deliver a copy or if this can be printed by the City. Happy to bring a copy by this afternoon.

Thanks,

Thomas

From: Jared Anable <janable@martindale.texas.gov>
Date: Monday, January 11, 2021 at 8:51 AM
To: Thomas Rhodes <thomas@tkarcres.com>
Cc: Sylvia Gomez <sgomez@martindale.texas.gov>, Lisa Shell Allen <lsa@martindale.texas.gov>, Rob Deviney <rdeviney@martindale.texas.gov>
Subject: Re: Walton Cotton Center WWTP Notice

Thomas,
How many pages are included in the application?

If it is more than 10 or so pages or includes pages that are great than 8.5" x 11", then you will need to deliver a hard copy of the application today at 409 Main St.

Thank you,

Jared

Sent from my iPhone

> On Jan 11, 2021, at 8:17 AM, Thomas Rhodes <thomas@tkarcres.com> wrote:
>
> Thank you Sylvia.
>
> I am following up on Mr. Anable's request for the application. I have a copy of the original version but I know it was amended prior to approval by TCEQ. I have requested from our engineering firm and will forward as soon as I receive.
>
> Thanks,
>
> Thomas

From: Sylvia Gomez <sgomez@martindale.texas.gov>
Date: Monday, January 11, 2021 at 8:14 AM
To: Thomas Rhodes <thomas@tkarcres.com>
Cc: Lisa Shell Allen <lsa@martindale.texas.gov>, Jared Anable <janable@martindale.texas.gov>, Rob Deviney <rdeviney@martindale.texas.gov>
Subject: Re: Walton Cotton Center WWTP Notice

Good morning Thomas,
Holidays were great and everything is well in the home front. Hope you and yours are doing well.

I posted the notice this morning.

Good day,
Sylvia

From: "Thomas K. Rhodes" <thomas@tkarcres.com>
To: sgomez@martindale.texas.gov
Cc: "Lisa Allan" <lsa@martindale.texas.gov>, "Jared Anable" <janable@martindale.texas.gov>

Sent: Friday, January 8, 2021 8:14:28 AM
Subject: Walton Cotton Center WWTP Notice

Sylvia,

I hope this finds you well and that you had a good holidays.

In accordance with the amendment to the development agreement that was approved in 2019, Walton is proceeding with obtaining a wastewater discharge permit for the Cotton Center project. We have received administrative approval of the application through TCEQ and are proceeding with public notification process.

I apologize in advance for the late notice, but would you be able to post the attached notice on the public notice board outside of City Hall by Monday, January 11th? The required newspaper notices will be running next week also and we need this posted concurrently.

Please feel free to give me a call if you or anyone at City Hall has any questions or needs any additional information.

Thanks,

Thomas K. Rhodes, CCIM
Manager & Broker
(512) 618-7449

<image001.jpg>

--

ma

Sylvia Gomez
City Clerk
City of Martindale
409 Main Street Phone: 512-357-2639
Martindale, TX 78655 Fax: 512-357-5826

--

Martindale%20Logo

Robert Deviney
Mayor
City of Martindale
409 Main Street Phone: 512-357-2639
Martindale, TX 78655 Fax: 512-357-5826

--

Martindale%20Logo

Robert Deviney
Mayor
City of Martindale
409 Main Street Phone: 512-357-2639
Martindale, TX 78655 Fax: 512-357-5826

TCEQ Public Notice Verification Form 2021-01-20.pdf
462 KB

[EMAIL 2]

Zimbra **janable@martindale.texas.gov**

Walton Texas, LP Cotton Center Discharge Permit

From : Thomas Rhodes <thomas@tkarcres.com> Tue, Nov 02, 2021 02:32 PM

Subject : Walton Texas, LP Cotton Center Discharge Permit 2 attachments

To :kglaze@martindale.texas.gov, mmcclabb@martindale.texas.gov, lsa@martindale.texas.gov

Cc : Jared Anable <janable@martindale.texas.gov>, Ed Hadley <EHadley@walton.com>, David Peter <DPeter@walton.com>

Mayor Glaze, Councilmember McClabb and Councilmember Shell-Allan,

Thank you for your time yesterday and for bringing the concerns with the Walton Cotton Center Discharge Permit effluent levels. As indicated, I emailed our engineer on this matter. The following was their response:

> *I quickly reviewed the AUC Group's permit application.*
>
> *Here is a quick summary of the 5-5-2-1 permit limits:*
> *5 mg/l – BOD (Biochemical oxygen demand - normally an oversized aeration basin can help meet this limit)*
> *5 mg/l – Suspended Solids (typically requires effluent filters just before discharge)*
> *2 mg/l – Ammonia Nitrogen (requires a plant designed for nitrification)*
> *1 mg/l – Phosphorus (typically requires chemical addition – alum is one that is commonly used)*
>
> *The AUC Group's "Treatment Process Description" included in the permit application does state that that the plant is designed for 10-15 permit limits.*
>
> *However, It appears to me that the treatment plant described in the "Treatment Process Description" attachment possibly anticipated more stringent permit limits.*
>
> *The proposed plant described included tertiary filters (for suspended solids removal) and alum addition (for the phosphorus limits). It also described the plant as being designed for "singlestage nitrification" which would help meet the ammonia-nitrogen limits. The only thing not shown in their calculations is the aeration basin being over-sized to meet the 5 mg/l BOD limits (although there are other ways to meet this 5 mg/l BOD limit).*
>
> *I do not think that major changes would be necessary to meet permit limitations of 5-5-2-1.*

As you are aware, Walton is obligated within the Development Agreement to provide treatment levels meeting 5-5-2-1. It appears as though some of the information in the original AUC application was not

properly carried throughout the document. Walton is currently working to see what can be done to amend the existing permit without having to restart the entire process. At a minimum, Walton will be required to ensure the final design of the plant would meet the discharge limitations required of the Development Agreement.

Please keep us apprised of any additional questions or concerns you may have and we will let you know updates on the Walton end as well. As always, feel free to reach out anytime if you have any questions or would like any additional information.

Thanks,

Thomas K. Rhodes, CCIM
Manager & Broker
(512) 618-7449

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REAL ESTATE SERVICES
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[FEMA FLOOD MAP SERVICE CENTER]

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-97.836943, 29.84999 Search

Whether you are in a high risk zone or not, you may need ood insurance (https://www.fema.gov/national- ood-insurance-program) because most homeowners insurance doesn't cover ood damage. If you live in an area with low or moderate ood risk, you are 5 times more likely to experience ood than a re in your home over the next 30 years. For many, a National Flood Insurance Program's ood insurance policy could cost less than $400 per year. Call your insurance agent today and protect what you've built.

Learn more about steps you can take (https://www.fema.gov/what-mitigation) to reduce ood risk damage.

MSC Home (/portal/)

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MSC Search All Products (/portal/advanceSearch)

MSC Products and Tools (/portal/resources/productsandtools)

Hazus (/portal/resources/hazus)

LOMC Batch Files (/portal/resources/lomc)

Product Availability (/portal/productAvailability)

MSC Frequently Asked Questions (FAQs) (/portal/resources/faq)

MSC Email Subscriptions (/portal/subscriptionHome)

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Search Results—Products for CALDWELL COUNTY UNINCORPORATED AREAS

Show ALL Products » (https://msc.fema.gov/portal/availabilitySearch?addcommunity=480094&communityName=CALDWELL COUN

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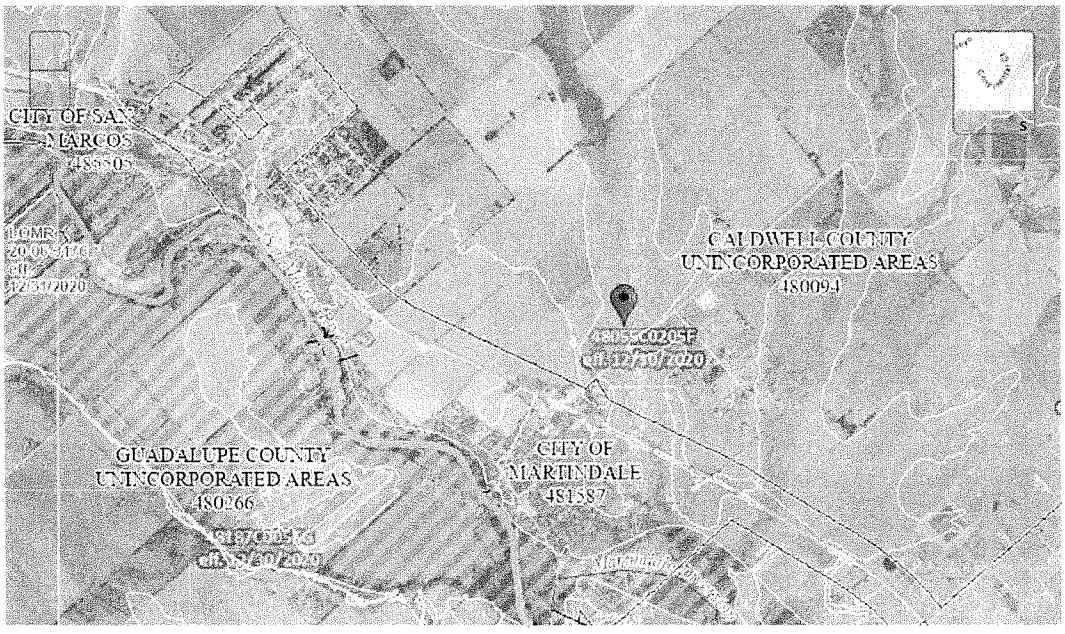
DYNAMIC MAP

MAP IMAGE

DOWNLOAD FIRM PANEL (https://msc.fema.gov/portal/downloadProduct?productTypeID=FINAL_PRODUCT&productSubTypeID=FIRM_PANEL&productID=48055C0205F)

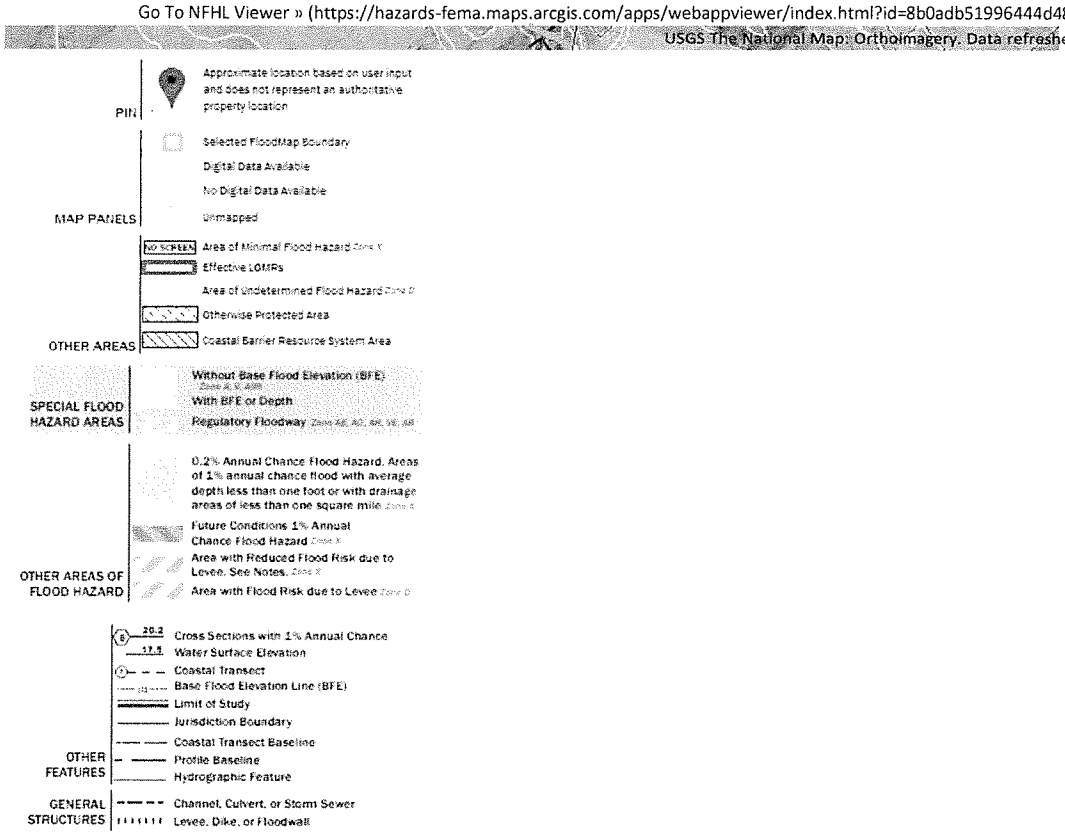


Changes to this FIRM

- Revisions (0)
- Amendments (0)
- Revalidations (0)

You can choose a new ood map or move the location pin by selecting a di erent location on the locator map below or by entering a new location in the search eld above. It may take a minute or more during peak hours to generate a dynamic FIRMette. If you are a person with a disability, are blind, or have low vision, and need assistance, please contact a map specialist (https://msc.fema.gov/portal/resources/contact).

Go To NFHL Viewer » (https://hazards-fema.maps.arcgis.com/apps/webappviewer/index.html?id=8b0adb51996444d4879338b55



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(https://www.oig.dhs.gov/hotline)

O cial website of the Department of Homeland Security

Lori Rowe

From: PUBCOMMENT-OCC
Sent: Monday, October 25, 2021 3:30 PM
To: PUBCOMMENT-WQ; PUBCOMMENT-ELD; PUBCOMMENT-OCC2; PUBCOMMENT-OPIC
Subject: FW: Public comment on Permit Number WQ0015918001

MWD
122210

PM

From: janable@martindale.texas.gov <janable@martindale.texas.gov>
Sent: Monday, October 25, 2021 1:35 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number WQ0015918001

REGULATED ENTY NAME COTTON CENTER MARTINDALE WWTP

RN NUMBER: RN111097283

PERMIT NUMBER: WQ0015918001

DOCKET NUMBER:

COUNTY: CALDWELL

PRINCIPAL NAME: WALTON TEXAS LP

CN NUMBER: CN604017491

FROM

NAME: Jared Anable

E-MAIL: janable@martindale.texas.gov

COMPANY: The City of Martindale

ADDRESS: 409 MAIN ST
MARTINDALE TX 78655-3822

PHONE: 5123572639

FAX: 5123575826

COMMENTS: Requesting Public Meeting to learn more about the wastewater discharge quality.

Lori Rowe

From: PUBCOMMENT-OCC
Sent: Monday, February 28, 2022 9:21 AM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: Public comment on Permit Number WQ0015918001
Attachments: 2022_WaltonGroup_HCA.pdf

MWD
122210

From: sydney@hillcountryalliance.org <sydney@hillcountryalliance.org>
Sent: Monday, February 28, 2022 9:02 AM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number WQ0015918001

REGULATED ENTY NAME COTTON CENTER MARTINDALE WWTP

RN NUMBER: RN111097283

PERMIT NUMBER: WQ0015918001

DOCKET NUMBER:

COUNTY: CALDWELL

PRINCIPAL NAME: WALTON TEXAS LP

CN NUMBER: CN604017491

FROM

NAME: Sydney Beckner

E-MAIL: sydney@hillcountryalliance.org

COMPANY: Hill Country Alliance

ADDRESS: 1305 HAWK TREE DR
COLLEGE STATION TX 77845-5139

PHONE: 9032383179

FAX:

COMMENTS: Comments are in attached pdf

education
conservation
cooperation

hill country alliance

Office of the Chief Clerk (MC-105)
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, Texas 78711-3087

February 28, 2022

RE: Request for denial of Walton Group Wastewater Permit Application as Proposed for TPDES Permit Number WQ0015918001

Dear Chief Clerk,

The Hill Country Alliance (HCA) recognizes that the Texas Commission on Environmental Quality (TCEQ) plays a critical role overseeing the health of our state's water quality, and we are appreciative of the huge effort that is involved in protecting this resource.

Communities throughout the Hill Country are conscious of the economic benefit of keeping their rivers, streams, and aquifers clean. Those water resources provide critical drinking water, recharge aquifers that support countless groundwater wells, support agricultural and domestic uses, and provide recreational opportunities—all of which are critical to the economy.

For the following reasons, HCA respectfully encourages the denial of the Walton Group's TPDES wastewater permit application (WQ0015918001) as proposed with effluent standards of 10-15-2-6. HCA supports the San Marcos River Foundation's (SMRF) recommendation for effluent standards of 5-5-2-0.5. It is our understanding that Walton Group has agreed with the City of Martindale to this lower standard, however, the permit application does not reflect this change.

It is important to also mention the serious concern that flooding poses for this area. Hemphill Creek, the proposed location for discharge, drains into Morrison Creek which has a history of flooding low water crossings during moderate rain events and posing serious public safety concerns. Requiring the Walton Group to beneficially reuse up to 75% of effluent produced has the potential of mitigating any negative impacts of future flooding events in Martindale.

Thank you for your consideration of these comments. If you have questions or concerns, please contact me at sydney@hillcountryalliance.org.

Respectfully,

Sydney Beckner

Sydney Beckner
Water Program Manager
Hill Country Alliance
Sydney@hillcountryalliance.org

Lori Rowe

From: PUBCOMMENT-OCC
Sent: Thursday, March 24, 2022 11:00 AM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: Public comment on Permit Number WQ0015918001

From: emapbrooks@hotmail.com <emapbrooks@hotmail.com>
Sent: Thursday, March 24, 2022 10:53 AM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number WQ0015918001

REGULATED ENTY NAME COTTON CENTER MARTINDALE WWTP

RN NUMBER: RN111097283

PERMIT NUMBER: WQ0015918001

DOCKET NUMBER:

COUNTY: CALDWELL

PRINCIPAL NAME: WALTON TEXAS LP

CN NUMBER: CN604017491

FROM

NAME: Pam Brooks

E-MAIL: emapbrooks@hotmail.com

COMPANY:

ADDRESS: 4409 MATHER
KYLE TX 78640-9292

PHONE: 5127877138

FAX:

COMMENTS: A constant water source would disrupt our ability to travel from one part of the farm located at 3563 S E River Rd, Martindale, TX 78655, to another since prior to this potentially happening the creek was dry enough to drive or walk across half of the year. The increase in algae in the creek where even treated sewage is discharged could have an effect on the drinkability of the water for wildlife and cattle, horses, etc. The neighbor of the farm located at 3563 S E River Rd, Martindale, TX 78655 uses his well on his property as his only source of water. His well and home are built right

next to the creek. The well at the farm located at 3563 S E River Rd, Martindale, T∧ ⁄8655 could be contaminated during high water events. I am concerned about the absorption zone of the water flow for the wells that supply Martindale public drinking water. There should be a total nitrogen limit. A limit only on ammonia-nitrogen is not a sufficient substitute. Limit of 1 mg/l total phosphorus is not sufficient to prevent algae blooms, and the resulting drop in dissolved oxygen levels leads to changes in aquatic life. Minimum dissolved oxygen level of 4 mg/l is not sufficient to maintain existing Dissolved Oxygen levels in the receiving water. Should be at least 6 mg/l. Should require UV disinfection instead of chlorine, which is harmful to aquatic life. Groundwater concerns of leaching into local water wells, which was also a concern with Cherryville and Riverbend Ranch. Permit should require beneficial reuse of effluent. Wastewater treatment plant will cause nuisance conditions in terms of odor, noise, light, and traffic. Class C operator is not sufficient. Should require a Class A operator. Discharge will have harmful effects on terrestrial wildlife and domestic livestock Hemphill Creek (discharge point) flows into Morrison Creek which often floods at the low-water crossing, and actually took the life of a couple a few years ago. More discharge could increase flooding issues.

Lori Rowe

From: PUBCOMMENT-OCC
Sent: Tuesday, April 12, 2022 11:51 AM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: Public comment on Permit Number WQ0015918001

From: flc.broker@gmail.com <flc.broker@gmail.com>
Sent: Monday, April 11, 2022 7:49 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number WQ0015918001

REGULATED ENTY NAME COTTON CENTER MARTINDALE WWTP

RN NUMBER: RN111097283

PERMIT NUMBER: WQ0015918001

DOCKET NUMBER:

COUNTY: CALDWELL

PRINCIPAL NAME: WALTON TEXAS LP

CN NUMBER: CN604017491

FROM

NAME: Frank Caldwell

EMAIL: flc.broker@gmail.com

COMPANY:

ADDRESS: PO BOX 531
MARTINDALE TX 78655-0531

PHONE: 5122990313

FAX:

COMMENTS: The facility is going to be built directly over an underground stream that feeds most of our wells in this Martindale area. My well is fed by this underground stream and is about 40 feet below surface. It flows West to East and goes directly under where this facility will be located. Other Martindale people use the same underground stream for their wells. In the 1950's this stream was the only source of water for the people during the massive drought of that

period. I don't think that there is any way that this facility can avoid polluting this underground stream that is vital to the wells in this area. The facility needs to be moved to another location.

Lori Rowe

From: PUBCOMMENT-OCC
Sent: Monday, April 11, 2022 8:55 AM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: Public comment on Permit Number WQ0015918001

MWD
122210

From: flc.broker@gmail.com <flc.broker@gmail.com>
Sent: Sunday, April 10, 2022 3:27 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number WQ0015918001

REGULATED ENTY NAME COTTON CENTER MARTINDALE WWTP

RN NUMBER: RN111097283

PERMIT NUMBER: WQ0015918001

DOCKET NUMBER:

COUNTY: CALDWELL

PRINCIPAL NAME: WALTON TEXAS LP

CN NUMBER: CN604017491

FROM

NAME: Frank Caldwell

EMAIL: flc.broker@gmail.com

COMPANY:

ADDRESS: PO BOX 531
MARTINDALE TX 78655-0531

PHONE: 5122990313

FAX:

COMMENTS: As I understand it, this package plant is to be constructed outside my backdoor. It will literally be adjacent to my property and within a stone's throw of my house. The well on my property has quite a history. Back in the 1950's when a major drought hit, it was the only source of water to the community. My property has underground streams running under it. This well, hand dug in the 1800's, sits on top of one of these underground streams. From the TCEQ map it appears that this package plant will sit on top of the same underground stream. If there is any spillage and/or leaks of

sewage it will seep into this underground stream and pollute what may be the only source of water for drinking for the local community. Additionally, several years ago, this whole area flooded. My house and my barn were the only structures out of the flood waters. There has not been sufficient drainage improvements to the area to prevent a similar flood should we get another cloud burst. What the chances are that a package plant in a flood area could result in a pollution disaster is , I don't know. It seems to me that the treatment plant should be located either across Hwy. 142 and out of the flood zone, or at the current Martindale treatment plant. I think building a package plant at the proposed location is shortsighted and foolish.

FLC
Frank L. Caldwell, Broker
512 299-0313

MWD
122210

REVIEWED
OCT 22 2021
By GCW

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
2021 OCT 21 AM 9:42
CHIEF CLERKS OFFICE

October 19, 2021

TCEQ
Office of the Chief Clerk
MC-105
P.O. Box 13087
Austin, Texas 78711-3087

To Whom It May Concern:

Please receive this letter as a protest against the construction of a Package Plant (Permit No. WQ0015918001) in Caldwell County by Walton Global Holdings.

I live at 12876 Highway 142 in Martindale, Texas (512 299-0313). The proposed Package Plant is approximately 500 feet from my Northwestern property line. Please add my name to the list seeking a contested hearing to examine the facts as to why this location is a bad choice for the developer, the environment, the consumer, and my particular property. I have also joined the San Marcos River Foundation and requested that they also address this problem in my interest.

I have practiced commercial real estate since 1972. I am well aware of development pro's and con's for both the developer and the consumer, as well as the environment. In the case of Walton's Martindale property, this location for a package plant has not been adequately researched nor seriously considered as to options that would be more advantageous to the developer and the consumer. It goes without saying that no homeowner would prefer to locate their home next to or within viewing distance of a wastewater station. The proposed location not only places this wastewater station within a "rock throwing" distance from my back door, but it also places it within the proposed development corridor of Walton's Cotton Center Master Plan. There are better alternatives for locating this wastewater plant than inside the development corridor of the Cotton Center. For one, Martindale already has a wastewater treatment plant located just off of Highway 80 which should be improved and expanded to serve the area, including Cotton Center. This would probably increase Walton's off-site cost, but the additional expenses can be absorbed into the overall revenue steam that approximately 1000 acres will provide to Walton over the term of the development. Secondly, back in 2013 we got approximately 8" of rain in a short time period, as it sometimes does in Texas. The existing drainage system is sufficient for smaller amounts of rain, but not for a cloud burst of that size. The water hit Highway 80 and

P. O. Box 531 Martindale, Tx. 78655 flc.broker@gmail.com

FLC

Frank L. Caldwell, Broker

512 299-0313

Highway 142 and backed up to cover several hundreds of acres. My house and barns were completely surrounded by water. That means that any future similar cloud burst situations would encompass the proposed package plant location and probably much of the area surrounding the proposed location. If there are homes in the general area, the danger of a massive flood in this area could result in wastewater and sewage flowing into the surrounding neighborhoods. Perhaps the drainage system can be enlarged to accommodate a cloud burst situation, but how do you measure that unknown quantity?

If the Package Plant was located across Highway 142 from my property and on the existing Walton land or adjacent land, the danger of a cloud burst flooding the wastewater plant would be lessened. Also, if Walton were to work with the City of Martindale to expand the exiting wastewater plant, then the element of a cloud burst flood would not become a factor in any future development.

Locating the wastewater plant at the proposed location has not be adequately researched and considered. I know this for a fact because the engineer for Walton called me up after the 2013 flood and asked to come discuss the flood problem with me on Walton's land. To my knowledge, after I had explained to him in detail the rivers of flood waters in my front and back yards and the surrounding area, no positive measures were undertaken to improve the existing drainage system. Consequently, this is a problem that is waiting to occur again, with or without the proposed wastewater plant location.

I would suggest that the TCEQ table this permit until additional information and alternative methods of treating the wastewater for future development are undertaken.

With Regards,

Frank L. Caldwell

cc. Virginia Conde, Director
San Marcos River Foundation

P. O. Box 531 Martindale, Tx. 78655 flc.broker@gmail.com

FLC
Frank L. Caldwell, Broker
512 299-0313

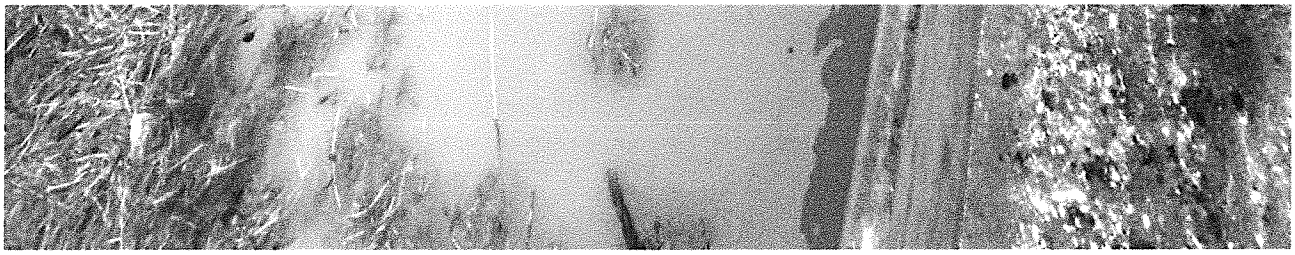
P. S. If the TCEQ decides to grant Walton this permit, I would hope that they would require them to affect a 75% to 100% reuse qualification for this discharge in light of the expected future of water availability concerns with regards to climate change.

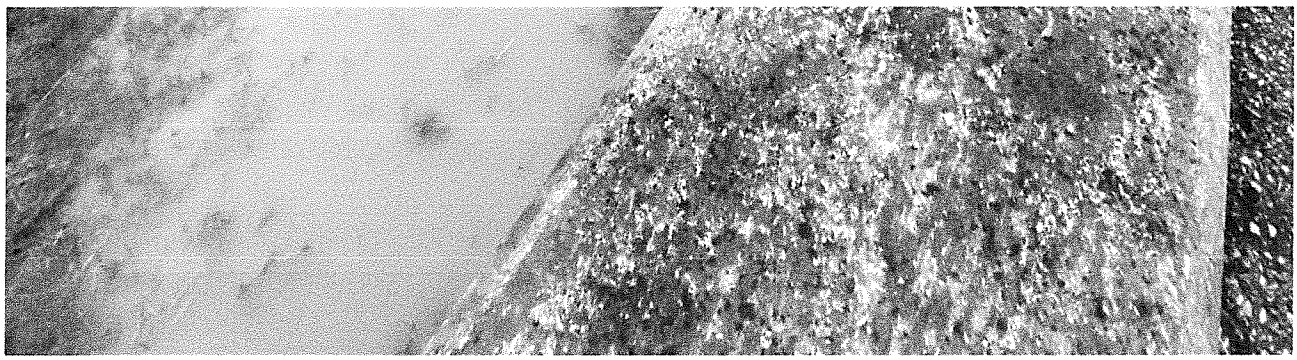
Additionally, If Walton does not agree to a 100% reuse qualification, then I would suggest a 5-5-2-0.5 quality level so as to not increase algal blooms and protect the water quality in the creeks and rivers.

P. O. Box 531 Martindale, Tx. 78655 flc.broker@gmail.com

Evidence of flooding in creek bordering my property and into which Walton wants to dump their treated wastewater.

The 2013 flood was 10x worse than this.





PO 531
MARTINDALE, TX
78655

7018 2290 0001 0784 4708

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OCT 21 2021
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TEXAS
COMMISSION
ON ENVIRONMENTAL
QUALITY

2021 OCT 21

TCEQ
Office of the Chief Clerk
MC-105
PO Box 13087
Austin, TX 78711-3087

Lori Rowe

From: PUBCOMMENT-OCC
Sent: Tuesday, April 12, 2022 11:36 AM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: COMMENTS RE: TCEQ HEARING ON WATER QUALITY FOR WALTON COTTON CENTER PERMIT #WQ0015981001

From: CHIEFCLK <chiefclk@tceq.texas.gov>
Sent: Tuesday, April 12, 2022 8:21 AM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: FW: COMMENTS RE: TCEQ HEARING ON WATER QUALITY FOR WALTON COTTON CENTER PERMIT #WQ0015981001

From: C Y N D I E <cyndiecolburn@gmail.com>
Sent: Monday, April 11, 2022 9:04 PM
To: CHIEFCLK <chiefclk@tceq.texas.gov>
Subject: COMMENTS RE: TCEQ HEARING ON WATER QUALITY FOR WALTON COTTON CENTER PERMIT #WQ0015981001

Hello, and thank you for holding the hearing on a virtual platform for those of us that cannot always attend in person.

I always have issues with the microphone feedback, so I'm opting to put my comments in writing.

I just want to reiterate what was said by many of my neighbors in attendance. I have lived on the San Marcos River all of my life and remember what the river looked like prior to the building of the San Marcos water treatment plant. The river used to be crystal clear throughout Martindale, Staples, and further down. You could see the muddy, rocky bottom even at depths of up to 15 feet. After the treatment plant began dumping its treated water, the river bottom changed and became covered in algae. The water became murky in places that it had not been, previously. This was with the standard permitting of 5-5-2-1. I believe that adding another treatment plant will impact our river further down.
I feel that this area is not currently able to handle the proposed output and would suggest denying the permit application at this time.I believe that there is a solution that will benefit everyone, but at this time, I don't feel that this is a viable option for our community, residents, rivers and streams, aquatic wildlife, and other natural resources.

Thank you.

Cyndie Colburn
Martindale Resident
512-393-8734

Lori Rowe

From: PUBCOMMENT-OCC
Sent: Thursday, November 4, 2021 9:21 AM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: Public comment on Permit Number WQ0015918001

PM

From: kelly@sosalliance.org <kelly@sosalliance.org>
Sent: Wednesday, November 3, 2021 4:32 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number WQ0015918001

REGULATED ENTY NAME COTTON CENTER MARTINDALE WWTP

RN NUMBER: RN111097283

PERMIT NUMBER: WQ0015918001

DOCKET NUMBER:

COUNTY: TX

PRINCIPAL NAME: WALTON TEXAS LP

CN NUMBER: CN604017491

FROM

NAME: Kelly D Davis

E-MAIL: kelly@sosalliance.org

COMPANY:

ADDRESS: 3809 MENCHACA RD APT H
AUSTIN TX 78704-6630

PHONE: 5124772320

FAX:

COMMENTS: I am concerned that TCEQ has not yet set a public meeting on this permit application and draft permit (WQ0015918001). Per TCEQ regulations, "The executive director or the Office of the Chief Clerk shall hold a public meeting if: .... (2) a member of the legislature who represents the general area in which the facility is located or proposed to be located requests that a public meeting be held;" 30 TAC 55.154. Senator Judith Zaffirini submitted a request for a public meeting by letter dated October 4, 2021. The letter appears in the Commissioners' Integrated

Database on this permit application, and is stamped as being "Reviewed" on October 6, 2021. Senator Zaffirini is a member of the legislature who represents the area in which the facility is proposed to be located. Therefore, her request triggers a mandatory duty to hold a public meeting, and I request that TCEQ set a public meeting promptly. Thank you, Kelly Davis

Lori Rowe

From: PUBCOMMENT-OCC
Sent: Thursday, October 28, 2021 9:21 AM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: Public comment on Permit Number WQ0015918001

PM

From: arlisann@gmail.com <arlisann@gmail.com>
Sent: Thursday, October 28, 2021 12:02 AM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number WQ0015918001

REGULATED ENTY NAME COTTON CENTER MARTINDALE WWTP

RN NUMBER: RN111097283

PERMIT NUMBER: WQ0015918001

DOCKET NUMBER:

COUNTY: CALDWELL

PRINCIPAL NAME: WALTON TEXAS LP

CN NUMBER: CN604017491

FROM

NAME: Arlis Flores

E-MAIL: arlisann@gmail.com

COMPANY:

ADDRESS: PO BOX 538
MARTINDALE TX 78655-0538

PHONE: 5125573930

FAX:

COMMENTS: Please help the water supply of Martindale stay clean by forcing this permit to do better in regards to not discharging into creeks that lead to our San Marcos river. This needs to be a public discussion.

Regarding the Cotton Center Sewage Discharge into Hemphill Creek: Permit Number WQ0015918001

MWD
122210

Whereas Walton Texas LP has applied for a permit to discharge treated wastewater into Hemphill Creek, up to 420,000 gallons per day;

Whereas the proposed level of treatment in the draft TCEQ discharge permit is insufficient to protect the quality of the water in Hemphill Creek, thence to Morrison Creek, thence to the lower San Marcos River, and

Whereas there are families, livestock, and wildlife who will be adversely affected by this wastewater at that level of treatment, and

Whereas the Martindale Water Supply Corporation wellhead protection area could be adversely affected by this wastewater,

I, Steven C. Fonville, Signature,

request a public meeting regarding this permit. And, I wish to be added to the mailing list on this permit, so I receive notices about further steps in this permit process.

Steven C. Fonville, Gen. Manager
Martindale Water Supply Corporation
P. O. Box 175 Martindale, 78655-0175

512-357-6951 martwsc@austin.rr.com

REVIEWED
OCT 22 2021
By GCW PM

2021 OCT 21 PM 2:30
OFFICE OF CHIEF CLERK
TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Reasons that The Corporation is affected:

The Martindale WSC operates 3 public drinking water supply wells within one mile (Approx.) of the proposed discharge. Please see the attached wellhead protection area map. The well protection area closely bounds Hemphill Creek, the proposed receiving stream for the partially treated discharge. The Water Corporation had only two active wells at the time this map was produced. The source water for these three wells is groundwater from a recent Pleistocene alluvium formation which is bisected by Hemphill Creek. The potential for partially treated wastewater to commingle or enter this water bearing formation is high, thereby possibly degrading the existing groundwater quality.

All public comments or public meeting requests must be submitted to the Office of the Chief Clerk, MC-105, Texas Commission on Environmental Quality, PO Box 13087, Austin, TX 78711-3087 or electronically at www14.tceq.texas.gov/epic/eComment/ within 30 days from the date of newspaper publication of permit notice.

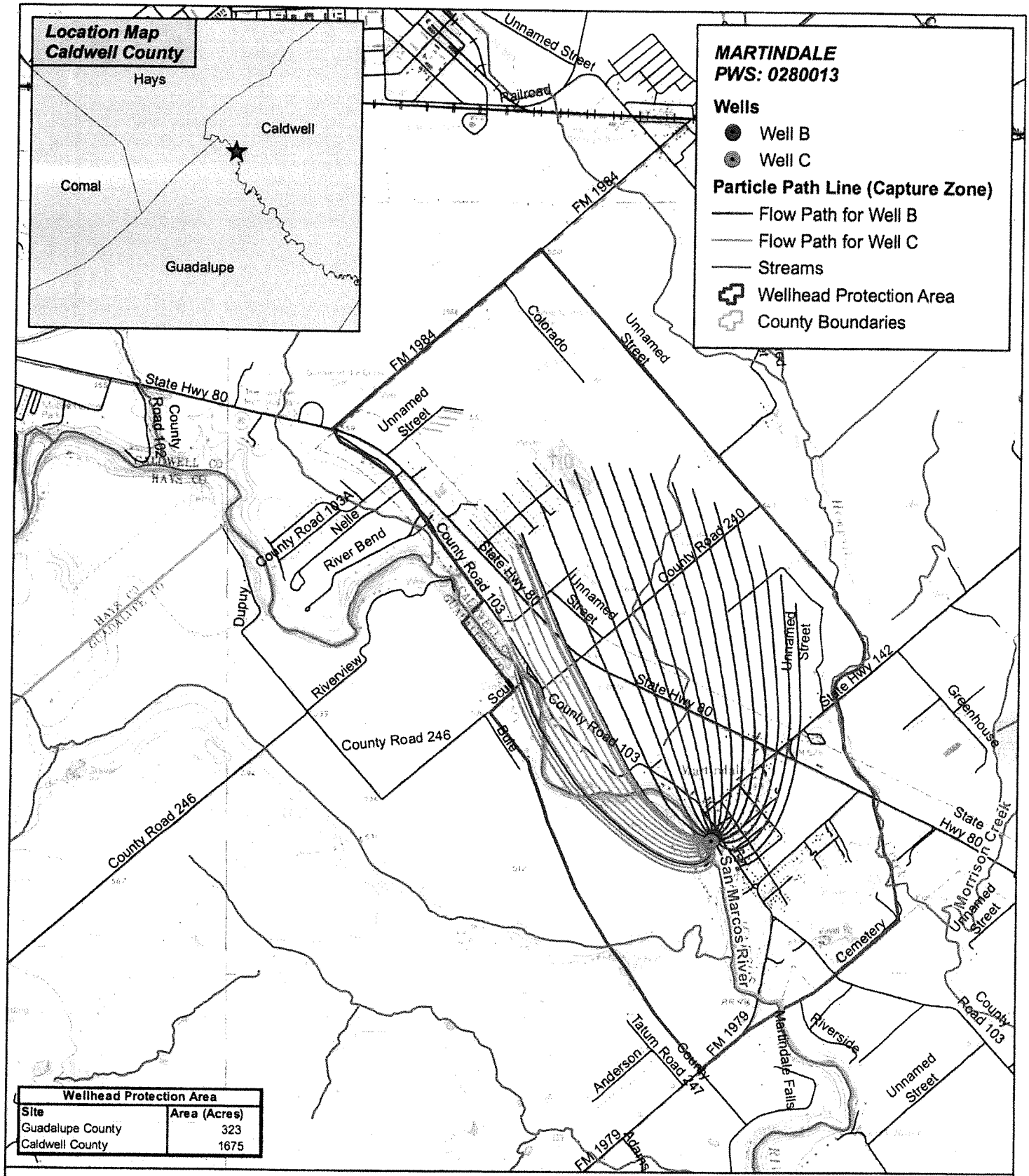

Figure 2-1
WELLHEAD PROTECTION AREA
MARTINDALE
PWS ID NO. 0280013

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EP13F

Lori Rowe

From: PUBCOMMENT-OCC
Sent: Tuesday, April 12, 2022 11:55 AM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: Public comment on Permit Number WQ0015918001

From: tracyoharp@gmail.com <tracyoharp@gmail.com>
Sent: Monday, April 11, 2022 7:11 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number WQ0015918001

REGULATED ENTY NAME COTTON CENTER MARTINDALE WWTP

RN NUMBER: RN111097283

PERMIT NUMBER: WQ0015918001

DOCKET NUMBER:

COUNTY: CALDWELL

PRINCIPAL NAME: WALTON TEXAS LP

CN NUMBER: CN604017491

FROM

NAME: Tracy Harp

EMAIL: tracyoharp@gmail.com

COMPANY:

ADDRESS: 2313 FARNSWOOD CIR
AUSTIN TX 78704-4519

PHONE: 5125672976

FAX:

COMMENTS: I am opposed to Walton's permit application. My family has owned property on the San Marcos River since 1943. Our property is located about three miles downstream from where Morrison Creek flows into the San Marcos River. We must not allow developers to continue the discharge of treated effluent into the San Marcos River. The river is not currently polluted, and we need to keep it a clean river. The San Marcos River brings tourism and natural beauty that, once ruined, can not easily be reclaimed. Unfortunately, there are an ever-increasing number of developers who

are requesting to dump their "treated" wastewater into creeks that flow into the San Marcos River. The request by Walton is only the most recent one of which we are aware. Any more treated effluent released into the San Marcos River will degrade the quality of water in the river. Reuse is the key to preserving river quality, and developers should make beneficial reuse of their treated wastewater. One recent permit was for the Cherryville development, and they agreed to at least a 75% beneficial reuse of its treated wastewater. We would expect Walton to be required to reuse at least 75% (or greater) of its treated wastewater as well. For any wastewater that is released, there are several treatment, operational, and environmental considerations that should be required in the Walton permit to preserve the quality of the water in the San Marcos River: • There should be a total nitrogen limit. A limit only on ammonia-nitrogen is not a sufficient substitute. • There should be a limit of less than 1 mg/l total phosphorus to prevent algae blooms and to prevent the resulting drop in dissolved oxygen levels to cause detrimental changes in aquatic life. • There should be a minimum dissolved oxygen level of at least 6 mg/l. A minimum level of 4 mg/l is not sufficient to maintain existing dissolved oxygen levels in the receiving water. • The permit should require UV disinfection instead of chlorine, which is harmful to aquatic life. • The very real concern of groundwater leaching into local water wells, which was also a concern with Cherryville and Riverbend Ranch, should definitely be addressed. • The permit should require a Class A operator. A Class C operator is not sufficient. • The fact that the wastewater treatment plant will cause nuisance conditions in terms of odor, noise, light, and traffic should be considered for the benefit of nearby residents. • TCEQ should consider that Hemphill Creek (the proposed discharge point) flows into Morrison Creek which often floods at the low water crossing on CR 103, resulting in the death of a couple who lived on CR 103 and whose vehicle was swept off the road at the creek during a flood a few years ago. Any wastewater discharged into Hemphill Creek will only exacerbate the flooding issues on Morrison Creek. We have had four generations of family members who have been able to enjoy swimming, fishing, floating, and kayaking in the river. We ask that you help to preserve that enjoyment for generations to come. Thank you. Tracy Harp 2313 Farnswood Cir Austin, TX 78704 tracyoharp@gmail.com

Lori Rowe

From: PUBCOMMENT-OCC
Sent: Thursday, March 17, 2022 1:32 PM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: Public comment on Permit Number WQ0015918001

From: jahend@gmail.com <jahend@gmail.com>
Sent: Thursday, March 17, 2022 11:04 AM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number WQ0015918001

REGULATED ENTY NAME COTTON CENTER MARTINDALE WWTP

RN NUMBER: RN111097283

PERMIT NUMBER: WQ0015918001

DOCKET NUMBER:

COUNTY: CALDWELL

PRINCIPAL NAME: WALTON TEXAS LP

CN NUMBER: CN604017491

FROM

NAME: Jacob Hendrickson

E-MAIL: jahend@gmail.com

COMPANY:

ADDRESS: 1213 BURLESON ST
SAN MARCOS TX 78666-4766

PHONE: 5126586747

FAX:

COMMENTS: As a lifelong central Texan and a new dad I'm writing in hopes that my daughter may grown up enjoying the natural beauty of our rivers and streams that I did growing up. There should be a total nitrogen limit. A limit only on ammonia-nitrogen is not a sufficient substitute. Limit of 1 mg/l total phosphorus is not sufficient to prevent algae blooms, and the resulting drop in dissolved oxygen levels leads to changes in aquatic life. Minimum dissolved oxygen level of 4 mg/l is not sufficient to maintain existing Dissolved Oxygen levels in the receiving water. Should be at least 6

mg/l. Should require UV disinfection instead of chlorine, which is harmful to aquatic life. Groundwater concerns of leaching into local water wells, which was also a concern with Cherryville and Riverbend Ranch. Permit should require beneficial reuse of effluent. Wastewater treatment plant will cause nuisance conditions in terms of odor, noise, light, and traffic. Class C operator is not sufficient. Should require a Class A operator. Discharge will have harmful effects on terrestrial wildlife and domestic livestock Hemphill Creek (discharge point) flows into Morrison Creek which often floods at the low-water crossing, and actually took the life of a couple a few years ago. More discharge could increase flooding issues.

Lori Rowe

From: PUBCOMMENT-OCC
Sent: Tuesday, October 26, 2021 11:36 AM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: Public comment on Permit Number WQ0015918001

From: holmeslandservice@yahoo.com <holmeslandservice@yahoo.com>
Sent: Monday, October 25, 2021 8:52 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number WQ0015918001

REGULATED ENTY NAME COTTON CENTER MARTINDALE WWTP

RN NUMBER: RN111097283

PERMIT NUMBER: WQ0015918001

DOCKET NUMBER:

COUNTY: CALDWELL

PRINCIPAL NAME: WALTON TEXAS LP

CN NUMBER: CN604017491

FROM

NAME: Michael Holmes

E-MAIL: holmeslandservice@yahoo.com

COMPANY:

ADDRESS: PO BOX 220
MARTINDALE TX 78655-0220

PHONE: 5127389232

FAX:

COMMENTS: I am the first land owner down stream on Hemphill Creek. My cattle drink from the creek, my residence is approximately 100' from the creek, and I have a water well 40' from the creek. I am very concerned about the level of treatment of the discharge from the proposed treatment plant. If the level of treatment is sufficient for the safety of my cattle, my wildlife, my water well, then I do not object to granting the permit. I just want to be assured that the level of treatment is to be high enough to ensure the current quality of the water in Hemphill Creek.

MWD
122210

2022 MAR 24 PM 3:37
CHIEF CLERKS OFFICE
REVIEWED
MAR 25 2022
By GCN
Received

I am writing regarding the Walton Wastewater Treatment Plant
Permit # WQ0015918001

We need to protect our beautiful San Marcos River & subsequent waterways. I am afraid the oxygen levels will not be adequately maintained causing overstimulation of plants & algae causing damage to aquatic life.

1. Total nitrogen must be limited - a limit of ammonia-nitrogen is not an adequate substitute
2. Total phosphorus needs to be limited to 1 mg to prevent algae blooms.
3. UV disinfection should be used instead of chlorine as chlorine can cause harm to aquatic life.

Safety is also a major concern

1. In an already high volume area the treatment plant will be a nuisance in noise, light, traffic & odor.
2. The permit must require a Class A operator in such an ecologically sensitive area.
3. Collateral damage must be considered. The Hemphill Creek discharge point flows into Harrison Creek, an area which often floods. Discharge there could increase flooding. We have recently lost a community member there, we need no more preventable deaths.

I am also concerned that the permit require beneficial reuse of effluent discharge. We must have sustainable water management.

I am concerned about the effect on terrestrial wildlife. My husband + I are working to improve our land through wildlife management and ~~we~~ with our proximity to the river, the treatment plant could have an adverse effect.

Please consider the above points in granting the permit for the Walton Wastewater Treatment Plant and protect our river, creeks, wildlife and quality of life.

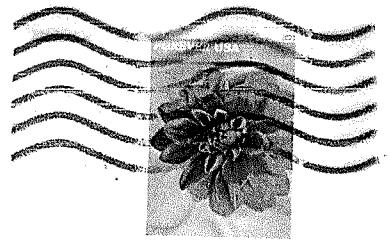
Thank you,

Sara Holzgrafe

SARA HOLZGRAFE
1300 Martindale Falls Way

1300 Marshdale Falls Loop
Marshdale, TX 78628

SAN ANTONIO TX 780
RIO GRANDE DISTRICT
22 MAR 2022 PM 3 L



ON ENVIRONMENTAL

MAR 24 2022

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TCEQ MAIL CENTER

Office of the Chief Clerk, TCEQ
Mail Code MC-105
P.O Box 13087
Austin, TX 78711-3087

78711-308787

Lori Rowe

From: PUBCOMMENT-OCC
Sent: Tuesday, March 22, 2022 1:48 PM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: Public comment on Permit Number WQ0015918001

From: starjennings@hotmail.com <starjennings@hotmail.com>
Sent: Tuesday, March 22, 2022 1:34 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number WQ0015918001

REGULATED ENTY NAME COTTON CENTER MARTINDALE WWTP

RN NUMBER: RN111097283

PERMIT NUMBER: WQ0015918001

DOCKET NUMBER:

COUNTY: CALDWELL

PRINCIPAL NAME: WALTON TEXAS LP

CN NUMBER: CN604017491

FROM

NAME: MR Star Jennings

E-MAIL: starjennings@hotmail.com

COMPANY:

ADDRESS: 1502 DRAKE AVE
AUSTIN TX 78704-2441

PHONE: 5129407932

FAX:

COMMENTS: I am against this proposal for the following reasons: A constant water source would disrupt our ability to travel from one part of our farm (3563 S E River Rd, Martindale, TX 78655) to another since prior to this potentially happening the creek was dry enough to drive or walk across half of the year. The increase in algae in the creek where even treated sewage is discharged could have an effect on the drinkability of the water for wildlife and cattle, horses, etc. Our neighbor uses his well on his property as his only source of water. His well and home are built right next to the

creek. Our own well could be contaminated during high water events. I am concerned about the absorption zone of the water flow for the wells that supply Martindale public drinking water. There should be a total nitrogen limit. A limit only on ammonia-nitrogen is not a sufficient substitute. Limit of 1 mg/l total phosphorus is not sufficient to prevent algae blooms, and the resulting drop in dissolved oxygen levels leads to changes in aquatic life. Minimum dissolved oxygen level of 4 mg/l is not sufficient to maintain existing Dissolved Oxygen levels in the receiving water. Should be at least 6 mg/l. Should require UV disinfection instead of chlorine, which is harmful to aquatic life. Groundwater concerns of leaching into local water wells, which was also a concern with Cherryville and Riverbend Ranch. Permit should require beneficial reuse of effluent. Wastewater treatment plant will cause nuisance conditions in terms of odor, noise, light, and traffic. Class C operator is not sufficient. Should require a Class A operator. Discharge will have harmful effects on terrestrial wildlife and domestic livestock Hemphill Creek (discharge point) flows into Morrison Creek which often floods at the low-water crossing, and actually took the life of a couple a few years ago. More discharge could increase flooding issues.

Lori Rowe

From: PUBCOMMENT-OCC
Sent: Tuesday, April 12, 2022 12:06 PM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: Public comment on Permit Number WQ0015918001

From: malcolm@mlakefish.com <malcolm@mlakefish.com>
Sent: Monday, April 11, 2022 4:15 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number WQ0015918001

REGULATED ENTY NAME COTTON CENTER MARTINDALE WWTP

RN NUMBER: RN111097283

PERMIT NUMBER: WQ0015918001

DOCKET NUMBER:

COUNTY: CALDWELL

PRINCIPAL NAME: WALTON TEXAS LP

CN NUMBER: CN604017491

FROM

NAME: Malcolm Johnson, III

EMAIL: malcolm@mlakefish.com

COMPANY:

ADDRESS: 465 RIVER BEND LN
MARTINDALE TX 78655-3819

PHONE: 5127570384

FAX:

COMMENTS: re the above referenced permit: 1 ppm Phosphorus not sufficient. Dissolved oxygen should be 6 ppm. class D operator license not sufficient. Needs to be class A. Great concern about effluent leaching into nearby wells. Hemphill Creek winds through Martindale City Water Company Wellhead protected area. The wells provide drinking water to the residents of Martindale and surrounding areas. 1 ppm Phosphorus limit is not low enough to prevent severe algae blooms in the creeks and in the San Marcos River. The proximity of the effluent discharge to downtown Martindale will

be objectionable. For these and other environmental concerns this effluent would be far better being reused in some way.

Lori Rowe

From: PUBCOMMENT-OCC
Sent: Tuesday, April 12, 2022 11:46 AM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: Public comment on Permit Number WQ0015918001

From: jjungers@austin.rr.com <jjungers@austin.rr.com>
Sent: Monday, April 11, 2022 8:20 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number WQ0015918001

REGULATED ENTY NAME COTTON CENTER MARTINDALE WWTP

RN NUMBER: RN111097283

PERMIT NUMBER: WQ0015918001

DOCKET NUMBER:

COUNTY: CALDWELL

PRINCIPAL NAME: WALTON TEXAS LP

CN NUMBER: CN604017491

FROM

NAME: Joy Jungers

EMAIL: jjungers@austin.rr.com

COMPANY: Joy Jungers

ADDRESS: PO BOX 598
MARTINDALE TX 78655-0598

PHONE: 5127539626

FAX:

COMMENTS: With Cherryville Wastewater Treatment plant discharging effluent into Dickerson Creek (thence to lower San Marcos River) just a few miles beyond the planned effluent entry point of the planned Walton WTP, I would request there be a study conducted to assess any possible compounding effects of multiple sources of wastewater effluent concentrated in such a short distance. Thank you.

Lori Rowe

From: PUBCOMMENT-OCC
Sent: Tuesday, April 12, 2022 12:01 PM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: Public comment on Permit Number WQ0015918001

From: jjungers@austin.rr.com <jjungers@austin.rr.com>
Sent: Monday, April 11, 2022 5:48 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number WQ0015918001

REGULATED ENTY NAME COTTON CENTER MARTINDALE WWTP

RN NUMBER: RN111097283

PERMIT NUMBER: WQ0015918001

DOCKET NUMBER:

COUNTY: CALDWELL

PRINCIPAL NAME: WALTON TEXAS LP

CN NUMBER: CN604017491

FROM

NAME: Joy Jungers

EMAIL: jjungers@austin.rr.com

COMPANY:

ADDRESS: PO BOX 598
MARTINDALE TX 78655-0598

PHONE: 5127539626

FAX:

COMMENTS: Thank you for taking the time to listen to questions and comments from my community about the planned Cotton Center Wastewater Treatment plant. I have several of my own: - If the planned wastewater treatment plant is anything like the one in San Marcos, it will undoubtedly cause odor, noise, and light nuisances for Martindale residents. - Effluent discharge will have negative effects on terrestrial and aquatic wildlife as well as domestic livestock. - Discharge into the river could cause deadly algae blooms which not only presents risks for humans and pets, but would also impact

water recreation and fishing. - Morrison Creek is especially flood-prone. The discharge by the planned wastewater treatment plant will worsen this situation. Walton LLC has presented no plans to address flood mitigation. - Discharge is planned within Martindale Water Supply Corporation's wellhead protection area and would negatively impact Martindale's drinking water. - Many residents have private water wells that will be negatively affected by contaminated groundwater. - The permit should require UV disinfection as chlorine is harmful to aquatic life. - The permit should require as close to 100% recapture and beneficial reuse of the effluent as possible. Again, many thanks for your time and careful consideration, Joy Jungers

Lori Rowe

From: PUBCOMMENT-OCC
Sent: Friday, October 22, 2021 1:21 PM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: Public comment on Permit Number WQ0015918001

MWD
122210

From: jjungers@austin.rr.com <jjungers@austin.rr.com>
Sent: Friday, October 22, 2021 12:39 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number WQ0015918001

REGULATED ENTY NAME COTTON CENTER MARTINDALE WWTP

RN NUMBER: RN111097283

PERMIT NUMBER: WQ0015918001

DOCKET NUMBER:

COUNTY: CALDWELL

PRINCIPAL NAME: WALTON TEXAS LP

CN NUMBER: CN604017491

FROM

NAME: JOY JUNGERS

E-MAIL: jjungers@austin.rr.com

COMPANY:

ADDRESS: PO BOX 598
MARTINDALE TX 78655-0598

PHONE: 5127539626

FAX:

COMMENTS: The planned Cotton Center Wastewater Treatment plant has specified effluent parameters in its permit application that are inadequate to protect Martindale's drinking water supply, the livestock that drink from Morrison Creek, the kids that play in that creek, the private water wells that will be directly impacted, the area wildlife, and could negatively impact aquatic species of the San Marcos River as well communities downriver that depend on the San Marcos River as a clean water source. Recreational use and fish harvesting from the river could also be impacted.

Lori Rowe

From: PUBCOMMENT-OCC
Sent: Tuesday, April 12, 2022 11:45 AM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: Public comment on Permit Number WQ0015918001

From: snikilake@yahoo.com <snikilake@yahoo.com>
Sent: Monday, April 11, 2022 8:23 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number WQ0015918001

REGULATED ENTY NAME COTTON CENTER MARTINDALE WWTP

RN NUMBER: RN111097283

PERMIT NUMBER: WQ0015918001

DOCKET NUMBER:

COUNTY: CALDWELL

PRINCIPAL NAME: WALTON TEXAS LP

CN NUMBER: CN604017491

FROM

NAME: Stacey Nicole Lake

EMAIL: snikilake@yahoo.com

COMPANY:

ADDRESS: 451 OLD ZORN RD
SAN MARCOS TX 78666-2001

PHONE: 5126670786

FAX:

COMMENTS: Our quality of life and that of the ecosystems here and downstream depend on this crucial resource - the waters of the San Marcos River, remaining clean. In regard to the proposed wastewater permit, there are a number of improvements that should he made to ensure reasonable water quality will be achieved. There should be a total nitrogen limit. A limit only on ammonia-nitrogen is not a sufficient substitute. A limit of 1 mg/l total phosphorus is not sufficient to prevent algae blooms. There should be a total nitrogen limit. A limit only on ammonia-nitrogen is not a

sufficient substitute. UV disinfection should be utilized instead of chlorine, which is harmful to aquatic life. Groundwater is at risk with concerns of leaching into local water wells, which was also a concern with Cherryville and Riverbend Ranch.This permit should require beneficial reuse of effluent. Wastewater treatment plant will cause nuisance conditions in terms of odor, noise, light, and traffic. Class C operator is not sufficient. A Class A operator should be required. Discharge will have harmful effects on terrestrial wildlife and domestic livestock where Hemphill Creek (discharge point) flows into Morrison Creek which often floods at the low-water crossing, and actually took the life of a couple a few years ago. More discharge would likely increase flooding issues as well.

Lori Rowe

From: PUBCOMMENT-OCC
Sent: Tuesday, April 12, 2022 12:02 PM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: Public comment on Permit Number WQ0015918001

From: snikilake@yahoo.com <snikilake@yahoo.com>
Sent: Monday, April 11, 2022 5:40 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number WQ0015918001

REGULATED ENTY NAME COTTON CENTER MARTINDALE WWTP

RN NUMBER: RN111097283

PERMIT NUMBER: WQ0015918001

DOCKET NUMBER:

COUNTY: CALDWELL

PRINCIPAL NAME: WALTON TEXAS LP

CN NUMBER: CN604017491

FROM

NAME: Stacey Nicole Lake

EMAIL: snikilake@yahoo.com

COMPANY:

ADDRESS: 451 OLD ZORN RD
SAN MARCOS TX 78666-2001

PHONE: 5126670786

FAX:

COMMENTS: Our quality of life and that of the ecosystems here and downstream depend on this crucial resource - the waters of the San Marcos River, remaining clean. In regard to the proposed wastewater permit, there are a number of improvements that should he made to ensure reasonable water quality will be achieved. There should be a total nitrogen limit. A limit only on ammonia-nitrogen is not a sufficient substitute. A limit of 1 mg/l total phosphorus is not sufficient to prevent algae blooms. There should be a total nitrogen limit. A limit only on ammonia-nitrogen is not a

sufficient substitute. UV disinfection should be utilized instead of chlorine, which is harmful to aquatic life. Groundwater is at risk with concerns of leaching into local water wells, which was also a concern with Cherryville and Riverbend Ranch.This permit should require beneficial reuse of effluent. Wastewater treatment plant will cause nuisance conditions in terms of odor, noise, light, and traffic. Class C operator is not sufficient. A Class A operator should be required. Discharge will have harmful effects on terrestrial wildlife and domestic livestock where Hemphill Creek (discharge point) flows into Morrison Creek which often floods at the low-water crossing, and actually took the life of a couple a few years ago. More discharge would likely increase flooding issues as well.

Lori Rowe

From: PUBCOMMENT-OCC
Sent: Thursday, October 28, 2021 9:13 AM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: Public comment on Permit Number WQ0015918001

From: drlasser@gmail.com <drlasser@gmail.com>
Sent: Thursday, October 28, 2021 7:21 AM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number WQ0015918001

REGULATED ENTY NAME COTTON CENTER MARTINDALE WWTP

RN NUMBER: RN111097283

PERMIT NUMBER: WQ0015918001

DOCKET NUMBER:

COUNTY: TX

PRINCIPAL NAME: WALTON TEXAS LP

CN NUMBER: CN604017491

FROM

NAME: Jon Lasser

E-MAIL: drlasser@gmail.com

COMPANY:

ADDRESS: 276 BELLA VISTA LN
MARTINDALE TX 78655-3910

PHONE: 5128094944

FAX:

COMMENTS: Cotton Center Wastewater Treatment plant permit application should not be approved without significant changes. They are planning to discharge into Hemphill Creek, which leads to Morrison Creek, and then into the San Marcos River. If approved as is, it could negatively impact Martindale wells (including that of the Martindale Water Service), livestock, wildlife, aquatic species in the SM River, water recreation, and human health. As I resident of Martindale, I'm concerned about these adverse impacts.

MWD
122210

March 19, 2022

To Whom It May Concern:

Please take the following points into account in regards to TCEQ Permit WQ0015918001 (Cotton Wood Creek).

- There should be a total nitrogen limit. A limit only on ammonia-nitrogen is not a sufficient substitute.
- Limit of 1 mg/l total phosphorus is not sufficient to prevent algae blooms, and the resulting drop in dissolved oxygen levels leads to changes in aquatic life.
- Minimum dissolved oxygen level of 4 mg/l is not sufficient to maintain existing Dissolved Oxygen levels in the receiving water. Should be at least 6 mg/l.
- Please require UV disinfection instead of chlorine, which is harmful to aquatic life.
- I'm concerned about leaching into local water wells.
- Permit should require beneficial reuse of effluent.
- Wastewater treatment plant will cause nuisance conditions in terms of odor, noise, light, and traffic.
- Class C operator is not sufficient. Should require a Class A operator.
- Discharge will have harmful effects on terrestrial wildlife and domestic livestock
- Hemphill Creek (discharge point) flows into Morrison Creek which often floods at the low-water crossing, and actually took the life of a couple a few years ago. More discharge could increase flooding issues.

Thank you for time,

Blanca Loya

San Marcos, TX 78666

Ms. Blanca Loya
605 Conway Dr.
San Marcos, TX 78666-7911

AUSTIN TX 786
RIO GRANDE DISTRICT
21 MAR 2022 PM 3 L

Office of the Chief Clerk, TCEQ
Mail Code MC-105
P.O. Box 13087
Austin, TX 78711-3087

MAR 23 2022
TCEQ MAIL CENTER
WT

78711-308787

Lori Rowe

From: PUBCOMMENT-OCC
Sent: Monday, March 21, 2022 10:10 AM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: Public comment on Permit Number WQ0015918001

From: shirleyogletree@gmail.com <shirleyogletree@gmail.com>
Sent: Thursday, March 17, 2022 1:49 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number WQ0015918001

REGULATED ENTY NAME COTTON CENTER MARTINDALE WWTP

RN NUMBER: RN111097283

PERMIT NUMBER: WQ0015918001

DOCKET NUMBER:

COUNTY: CALDWELL

PRINCIPAL NAME: WALTON TEXAS LP

CN NUMBER: CN604017491

FROM

NAME: Shirley M Ogletree

E-MAIL: shirleyogletree@gmail.com

COMPANY:

ADDRESS: 812 HILLYER ST
SAN MARCOS TX 78666-3134

PHONE: 5123960941

FAX:

COMMENTS: Our wonderful rivers are a incredible resource in central Texas. I am especially concerned with the San Marcos River, having enjoyed its beauty and recreational uses for multiple years. I'm worried that the Walton Wastewater Treatment with compromise the quality of this wonderful resource downstream. Specific concerns are mentioned below: 1) Please include a TOTAL nitrogen limit, not just a limit on ammonia-nitrogen. 2) Also, 1 mg/l phosphorus is not sufficiently protective of aquatic life.. 3) Dissolved oxygen levels should be at least 6 mg/l. 4) UV is

preferable to chlorine as a disinfectant. 5) Groundwater leaching into existing wells is also a concern. 6) Please require a beneficial use of effluent. 7) A Class A, rather than a Class C, operator is necessary to reduce the potential environmental impact of the plant. 8) Other problems include the impact of lights, noise, etc. on neighbors as well as harmful effects on livestock. Also, the potential impact of the plant on flooding needs to be considered.

Lori Rowe

From:	PUBCOMMENT-OCC
Sent:	Monday, April 11, 2022 8:56 AM
To:	PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject:	FW: Public comment on Permit Number WQ0015918001
Attachments:	Comments re Walton Wastewater Permit Request.pdf

From: mike@cagi.com <mike@cagi.com>
Sent: Sunday, April 10, 2022 2:03 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number WQ0015918001

REGULATED ENTY NAME COTTON CENTER MARTINDALE WWTP

RN NUMBER: RN111097283

PERMIT NUMBER: WQ0015918001

DOCKET NUMBER:

COUNTY: TX

PRINCIPAL NAME: WALTON TEXAS LP

CN NUMBER: CN604017491

FROM

NAME: Michael W Ohlendorf

EMAIL: mike@cagi.com

COMPANY:

ADDRESS: 1845 FM 1977
MARTINDALE TX 78655-3974

PHONE: 5125170733

FAX:

COMMENTS: Please see attached PDF with our comments and disregard the Word document we sent a couple of days ago, because it appears that all of the formatting in the Word document was disregarded when the document was uploaded. Thanks

Comments re Walton Wastewater Permit Request (Permit No. WQ0015918001)

Our family is opposed to Walton's permit application. We have owned property on the San Marcos River since 1943. Our property is located about three miles downstream from where Morrison Creek flows into the San Marcos River.

We must not allow developers to continue the discharge of treated effluent into the San Marcos River. The river is not currently polluted, and we need to keep it a clean river.

Unfortunately, there are an ever-increasing number of developers who are requesting to dump their "treated" wastewater into creeks that flow into the San Marcos River. The request by Walton is only the most recent one of which we are aware.

Any more treated effluent released into the San Marcos River will degrade the quality of water in the river. Reuse is the key to preserving river quality, and developers should make beneficial reuse of their treated wastewater. One recent permit was for the Cherryville development, and they agreed to at least a 75% beneficial reuse of its treated wastewater. We would expect Walton to be required to reuse at least 75% (or greater) of its treated wastewater as well.

For any wastewater that is released, there are several treatment, operational, and environmental considerations that should be required in the Walton permit to preserve the quality of the water in the San Marcos River:

- There should be a total nitrogen limit. A limit only on ammonia-nitrogen is not a sufficient substitute.
- There should be a limit of less than 1 mg/l total phosphorus to prevent algae blooms and to prevent the resulting drop in dissolved oxygen levels to cause detrimental changes in aquatic life.
- There should be a minimum dissolved oxygen level of at least 6 mg/l. A minimum level of 4 mg/l is not sufficient to maintain existing dissolved oxygen levels in the receiving water.
- The permit should require UV disinfection instead of chlorine, which is harmful to aquatic life.
- The very real concern of groundwater leaching into local water wells, which was also a concern with Cherryville and Riverbend Ranch, should definitely be addressed.
- The permit should require a Class A operator. A Class C operator is not sufficient.
- The fact that the wastewater treatment plant will cause nuisance conditions in terms of odor, noise, light, and traffic should be considered for the benefit of nearby residents.

- TCEQ should consider that Hemphill Creek (the proposed discharge point) flows into Morrison Creek which often floods at the low water crossing on CR 103, resulting in the death of a couple who lived on CR 103 and whose vehicle was swept off the road at the creek during a flood a few years ago. Any wastewater discharged into Hemphill Creek will only exacerbate the flooding issues on Morrison Creek.

We have had four generations of family members who have been able to enjoy swimming, fishing, floating, and kayaking in the river. We ask that you help to preserve that enjoyment for generations to come.

Thank you.

Michael and Nancy Ohlendorf
1845 FM 1977
Martindale TX 78655
mike@cagi.com

Lori Rowe

From: PUBCOMMENT-OCC
Sent: Monday, April 11, 2022 8:40 AM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: Public comment on Permit Number WQ0015918001

From: mike@cagi.com <mike@cagi.com>
Sent: Friday, April 8, 2022 8:11 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number WQ0015918001

REGULATED ENTY NAME COTTON CENTER MARTINDALE WWTP

RN NUMBER: RN111097283

PERMIT NUMBER: WQ0015918001

DOCKET NUMBER:

COUNTY: TX

PRINCIPAL NAME: WALTON TEXAS LP

CN NUMBER: CN604017491

FROM

NAME: MICHAEL W OHLENDORF

EMAIL: mike@cagi.com

COMPANY:

ADDRESS: 1845 FM 1977
MARTINDALE TX 78655-3974

PHONE: 5125170733

FAX:

COMMENTS: Comments re Walton Wastewater Permit Request (Permit No. WQ0015918001) Our family is opposed to Walton's permit application. We have owned property on the San Marcos River since 1943. Our property is located about three miles downstream from where Morrison Creek flows into the San Marcos River. We must not allow developers to continue the discharge of treated effluent into the San Marcos River. The river is not currently polluted, and we need to keep it a clean river. Unfortunately, there are an ever-increasing number of developers who are

requesting to dump their "treated" wastewater into creeks that flow into the San Marcos River. The request by Walton is only the most recent one of which we are aware. Any more treated effluent released into the San Marcos River will degrade the quality of water in the river. Reuse is the key to preserving river quality, and developers should make beneficial reuse of their treated wastewater. One recent permit was for the Cherryville development, and they agreed to at least a 75% beneficial reuse of its treated wastewater. We would expect Walton to be required to reuse at least 75% (or greater) of its treated wastewater as well. For any wastewater that is released, there are several treatment, operational, and environmental considerations that should be required in the Walton permit to preserve the quality of the water in the San Marcos River: • There should be a total nitrogen limit. A limit only on ammonia-nitrogen is not a sufficient substitute. • There should be a limit of less than 1 mg/l total phosphorus to prevent algae blooms and to prevent the resulting drop in dissolved oxygen levels to cause detrimental changes in aquatic life. • There should be a minimum dissolved oxygen level of at least 6 mg/l. A minimum level of 4 mg/l is not sufficient to maintain existing dissolved oxygen levels in the receiving water. • The permit should require UV disinfection instead of chlorine, which is harmful to aquatic life. • The very real concern of groundwater leaching into local water wells, which was also a concern with Cherryville and Riverbend Ranch, should definitely be addressed. • The permit should require a Class A operator. A Class C operator is not sufficient. • The fact that the wastewater treatment plant will cause nuisance conditions in terms of odor, noise, light, and traffic should be considered for the benefit of nearby residents. • TCEQ should consider that Hemphill Creek (the proposed discharge point) flows into Morrison Creek which often floods at the low water crossing on CR 103, resulting in the death of a couple who lived on CR 103 and whose vehicle was swept off the road at the creek during a flood a few years ago. Any wastewater discharged into Hemphill Creek will only exacerbate the flooding issues on Morrison Creek. We have had four generations of family members who have been able to enjoy swimming, fishing, floating, and kayaking in the river. We ask that you help to preserve that enjoyment for generations to come. Thank you. Michael and Nancy Ohlendorf 1845 FM 1977 Martindale TX 78655 mike@cagi.com

Lori Rowe

From: PUBCOMMENT-OCC
Sent: Tuesday, April 12, 2022 11:47 AM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: Public comment on Permit Number WQ0015918001

From: oriole.01-spectra@icloud.com <oriole.01-spectra@icloud.com>
Sent: Monday, April 11, 2022 8:19 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number WQ0015918001

REGULATED ENTY NAME COTTON CENTER MARTINDALE WWTP

RN NUMBER: RN111097283

PERMIT NUMBER: WQ0015918001

DOCKET NUMBER:

COUNTY: CALDWELL

PRINCIPAL NAME: WALTON TEXAS LP

CN NUMBER: CN604017491

FROM

NAME: Robert Ohlendorf

EMAIL: oriole.01-spectra@icloud.com

COMPANY:

ADDRESS: 2421 ABERDEEN DR
BEDFORD TX 76021-7969

PHONE: 5122896457

FAX:

COMMENTS: There should be a total nitrogen limit. A limit only on ammonia-nitrogen is not a sufficient substitute. Limit of 1 mg/l total phosphorus is not sufficient to prevent algae blooms, and the resulting drop in dissolved oxygen levels leads to changes in aquatic life. Minimum dissolved oxygen level of 4 mg/l is not sufficient to maintain existing Dissolved Oxygen levels in the receiving water. Should be at least 6 mg/l. Should require UV disinfection instead of chlorine, which is harmful to aquatic life. Groundwater concerns of leaching into local water wells, which was also a concern with

Cherryville and Riverbend Ranch. Permit should require beneficial reuse of effluent. Wastewater treatment plant will cause nuisance conditions in terms of odor, noise, light, and traffic. Class C operator is not sufficient. Should require a Class A operator. Discharge will have harmful effects on terrestrial wildlife and domestic livestock Hemphill Creek (discharge point) flows into Morrison Creek which often floods at the low-water crossing, and actually took the life of a couple a few years ago. More discharge could increase flooding issues.

Lori Rowe

From: PUBCOMMENT-OCC
Sent: Thursday, April 7, 2022 7:58 AM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: Public comment on Permit Number WQ0015918001

From: oriole.01-spectra@icloud.com <oriole.01-spectra@icloud.com>
Sent: Wednesday, April 6, 2022 12:01 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number WQ0015918001

REGULATED ENTY NAME COTTON CENTER MARTINDALE WWTP

RN NUMBER: RN111097283

PERMIT NUMBER: WQ0015918001

DOCKET NUMBER:

COUNTY: CALDWELL

PRINCIPAL NAME: WALTON TEXAS LP

CN NUMBER: CN604017491

FROM

NAME: Robert Carl Ohlendorf

EMAIL: oriole.01-spectra@icloud.com

COMPANY:

ADDRESS: 2421 ABERDEEN DR
BEDFORD TX 76021-7969

PHONE: 5122896457

FAX:

COMMENTS: Having the opportunity to review the input from Michael and Nancy Ohlendorf, I fully concur with their statements and requests. They are very reasonable and necessary to protect the San Marcos River. My family has owned property along the San Marcos River since 1946 and lies between the Staples Dam and Morrison Creek. We have treasured this unique gem in the state of Texas since then and have enjoyed the beauty and uses it offers. Please save this valuable part of Central Texas.

Lori Rowe

From: PUBCOMMENT-OCC
Sent: Tuesday, February 1, 2022 9:41 AM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: Public comment on Permit Number WQ0015918001

MWD
122210

From: R14236@sbcglobal.net <R14236@sbcglobal.net>
Sent: Monday, January 31, 2022 7:34 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number WQ0015918001

REGULATED ENTY NAME COTTON CENTER MARTINDALE WWTP

RN NUMBER: RN111097283

PERMIT NUMBER: WQ0015918001

DOCKET NUMBER:

COUNTY: CALDWELL

PRINCIPAL NAME: WALTON TEXAS LP

CN NUMBER: CN604017491

FROM

NAME: Robert C Ohlendorf

E-MAIL: R14236@sbcglobal.net

COMPANY: Retired

ADDRESS: 2421 ABERDEEN DR
BEDFORD TX 76021-7969

PHONE: 5122896457

FAX:

COMMENTS: Texas Rivers are a very essential part of what makes Texas Great. Actions must be taken to preserve these natural wonders. The state takes care of highways and the state should do the same for our rivers. While land development occurs there is no reason the responsible party cannot limit not only the amount of discharge through reuse but also significantly reduce the pollutants that are in the discharge. Appropriate actions are required to protect our rivers.

Lori Rowe

From: PUBCOMMENT-OCC
Sent: Monday, April 11, 2022 8:41 AM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: Public comment on Permit Number WQ0015918001
Attachments: 2022waltonwastewaterpermitcomments1.docx

From: tohlendorf@utexas.edu <tohlendorf@utexas.edu>
Sent: Friday, April 8, 2022 7:40 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number WQ0015918001

REGULATED ENTY NAME COTTON CENTER MARTINDALE WWTP

RN NUMBER: RN111097283

PERMIT NUMBER: WQ0015918001

DOCKET NUMBER:

COUNTY: CALDWELL

PRINCIPAL NAME: WALTON TEXAS LP

CN NUMBER: CN604017491

FROM

NAME: Thomas Ohlendorf

EMAIL: tohlendorf@utexas.edu

COMPANY:

ADDRESS: 984 ELM CREEK RD
LOCKHART TX 78644-4505

PHONE: 5129144447

FAX:

COMMENTS: Please see the attached comments for Permit No. WQ0015918001.

April 8, 2022 Comments
Re: Walton Wastewater Treatment Permit Request
Permit No. WQ0015918001

My parents purchased approximately 200 acres of land on the San Marcos River upstream from Staples, Texas in the late 1940's. The west boundary of their place was Morrison Creek and the south/west boundary was the San Marcos River. I have one brother, and growing up, we spent many hours enjoying camping, swimming, and boating on this beautiful river. With the passing of our parents, my brother and I inherited this property with my part bounding the river and Morrison Creek. Since then, two additional generations have continued to appreciate, value, and enjoy this river. Also, the property continues to be used for raising cattle and other agricultural purposes.

As the population continues to grow in this area and in Texas, it is very important preserve rivers and creeks like the San Marcos River and Morrison Creek as it joins the river. Once they are damaged by the release of improperly or insufficiently treated effluent, their quality and beauty will be lost forever.

As development occurs in the vicinity of the river, it is common to dump treated effluent into creeks that then empty into rivers that then empty into the gulf. After this process, many wet weather creeks become flowing creeks. These creeks, too, can be damaged from improperly treated effluent which can have harmful effects on wildlife and domestic livestock.

Why not do all we can to protect and preserve these rivers and creeks? The best step would be to not allow any discharge of treated effluent into the creeks and rivers. If it is allowed, we believe that the State should require developers to do more than just meet minimum requirements. Furthermore, once stringent requirements are approved for developments, they should be closely monitored for compliance.

If effluent is released into Morrison Creek and the San Marcos River, the following points should be required in the Walton Permit:

- There should be a total nitrogen limit. A limit only on ammonia-nitrogen is not a sufficient substitute.

- A limit of 1 mg/l total phosphorus is not sufficient to prevent algae blooms, and the resulting drop in dissolved oxygen levels leads to changes in aquatic life.
- A minimum dissolved oxygen level of 4 mg/l is not sufficient to maintain existing Dissolved Oxygen levels in the receiving water. It should be at least at least 6mg/l.
- The permit should require UV disinfection instead of chlorine which is harmful to aquatic life.
- There are very definitely groundwater concerns of leaching into local water wells, which was also a concern with Cherryville and Riverbend Ranch.
- The permit should require beneficial reuse of effluent.
- The wastewater treatment plant will cause nuisance conditions in terms of odor, noise, light, and traffic.
- A Class C operator is not sufficient. The permit should require a Class A operator.
- Discharge will have harmful effects on terrestrial wildlife and domestic livestock.
- Hemphill Creek (the proposed discharged point) flows into Morrison Creek which often floods at the low-water crossing on CR 103, and actually took the life of a couple a few years ago. More discharge would increase flooding issues.

In summary, we are opposed to Walton's permit application. We do not want to see any more treated effluent released into the San Marcos River that almost certainly, over time, will degrade the quality of the water in the river. Reuse is the key to preserving river quality. If a minimum of 75% of the wastewater is reused and any wastewater that is released is treated to the quality that we requested in our comments, the likelihood and extent of pollution in the river and the creek can hopefully be minimized.

Thomas and Susan Ohlendorf
984 Elm Creek Road
Lockhart, Texas 78644
tohlendorf@utexas.edu

Lori Rowe

From: PUBCOMMENT-OCC
Sent: Wednesday, April 6, 2022 9:10 AM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: Public comment on Permit Number WQ0015918001
Attachments: Photos of the San Marcos River and Morrison Creek for the Walton WWTP Request.pdf

MWD
122210

From: virginia@sanmarcosriver.org <virginia@sanmarcosriver.org>
Sent: Tuesday, April 5, 2022 10:53 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number WQ0015918001

REGULATED ENTY NAME COTTON CENTER MARTINDALE WWTP

RN NUMBER: RN111097283

PERMIT NUMBER: WQ0015918001

DOCKET NUMBER:

COUNTY: CALDWELL

PRINCIPAL NAME: WALTON TEXAS LP

CN NUMBER: CN604017491

FROM

NAME: Virginia Parker

EMAIL: virginia@sanmarcosriver.org

COMPANY: San Marcos River Foundation

ADDRESS: PO BOX 1393
SAN MARCOS TX 78667-1393

PHONE: 2108604575

FAX:

COMMENTS: Permit No: WQ0015918001 On behalf of the San Marcos River Foundation, I'd like to comment on the following issues with the requested wastewater treatment permit by the Walton group. (1) There is no limit on nitrogen. A limit only on ammonia-nitrogen is not a sufficient substitute. (2) The phosphorus limit should be at least .5 mg/l or lower. A limit of 1 mg/l total phosphorus is not sufficient to prevent algae blooms, and the resulting drop in dissolved

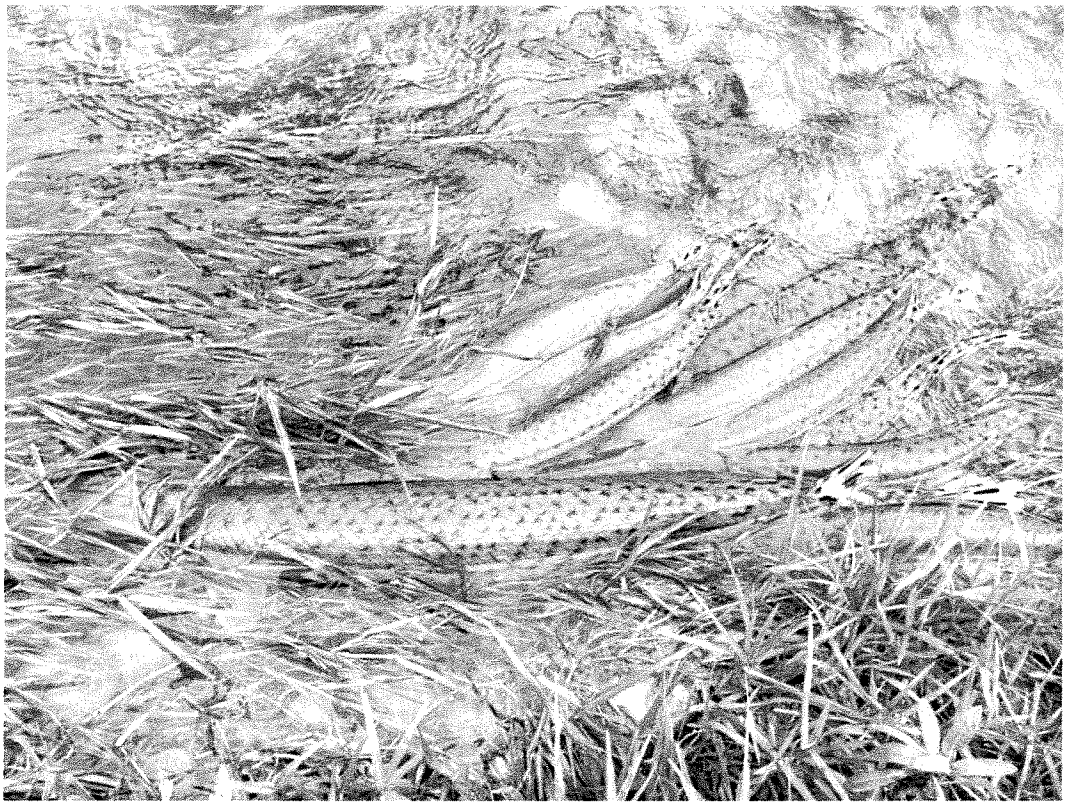
oxygen levels leads to changes in aquatic life. (3) There are no specific requirements for protecting the facility from 100 year floods. (4) There are endangered species that live in the San Marcos River. Any detriment to water quality from wastewater effluent could impact these species located downstream of the effluent. (5) This permit request fails to consider the regionalization of wastewater treatment plants in the area and the permit application contains errors that have not been corrected. (6) The minimum dissolved oxygen level of 4 mg/l is not sufficient to maintain existing Dissolved Oxygen levels in the receiving water. This should be at least 6 mg/l. (7) The permit should require UV disinfection instead of chlorine. Chlorine is harmful to aquatic life. (8) There are groundwater concerns of leaching into local water wells, which was also a concern with Cherryville and Riverbend Ranch wastewater treatment permits. (9) The permit should require beneficial reuse of effluent. (10) A wastewater treatment plant will cause nuisance conditions in terms of odor, noise, light, and traffic. (11) A class C operator is not sufficient. The permit should require a Class A operator. (12) The discharge will have harmful effects on terrestrial wildlife and domestic livestock. (13) Hemphill Creek (discharge point) flows into Morrison Creek which often floods at the low-water crossing, and actually took the life of a couple a few years ago. More discharge could increase flooding issues. (14) Attached please see photos of a) Flooding issues on Morrison Creek, and b) the beautiful San Marcos River as it normally is and the animals that depend on it's water quality. Sincerely, Virginia Parker Executive Director, San Marcos River Foundation virginia@sanmarcosriver.org

Photos of the San Marcos River and Morrison Creek for the Walton WWTP Request

Permit Request No: WQ0015918001

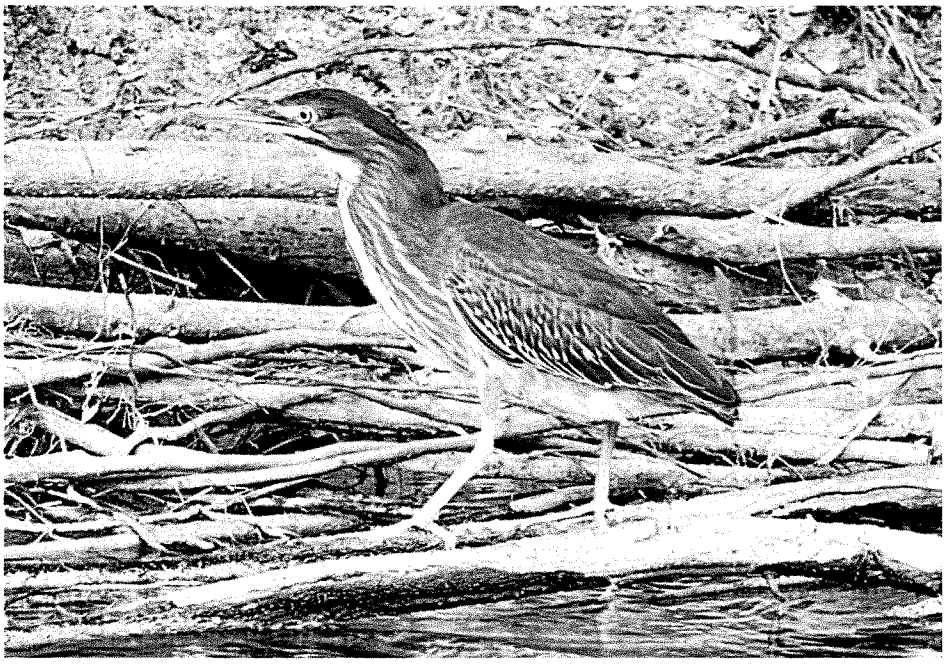
Pictured Above: Flooding on Morrison Creek covering SE River Road in Martindale. October 2015

Pictured Above: Morrison Creek during the 2015 flood. This crosses SE River Road, and a couple lost their lives on this road from a flash flood about 3 years ago. Additional effluent will only worsen the issue.



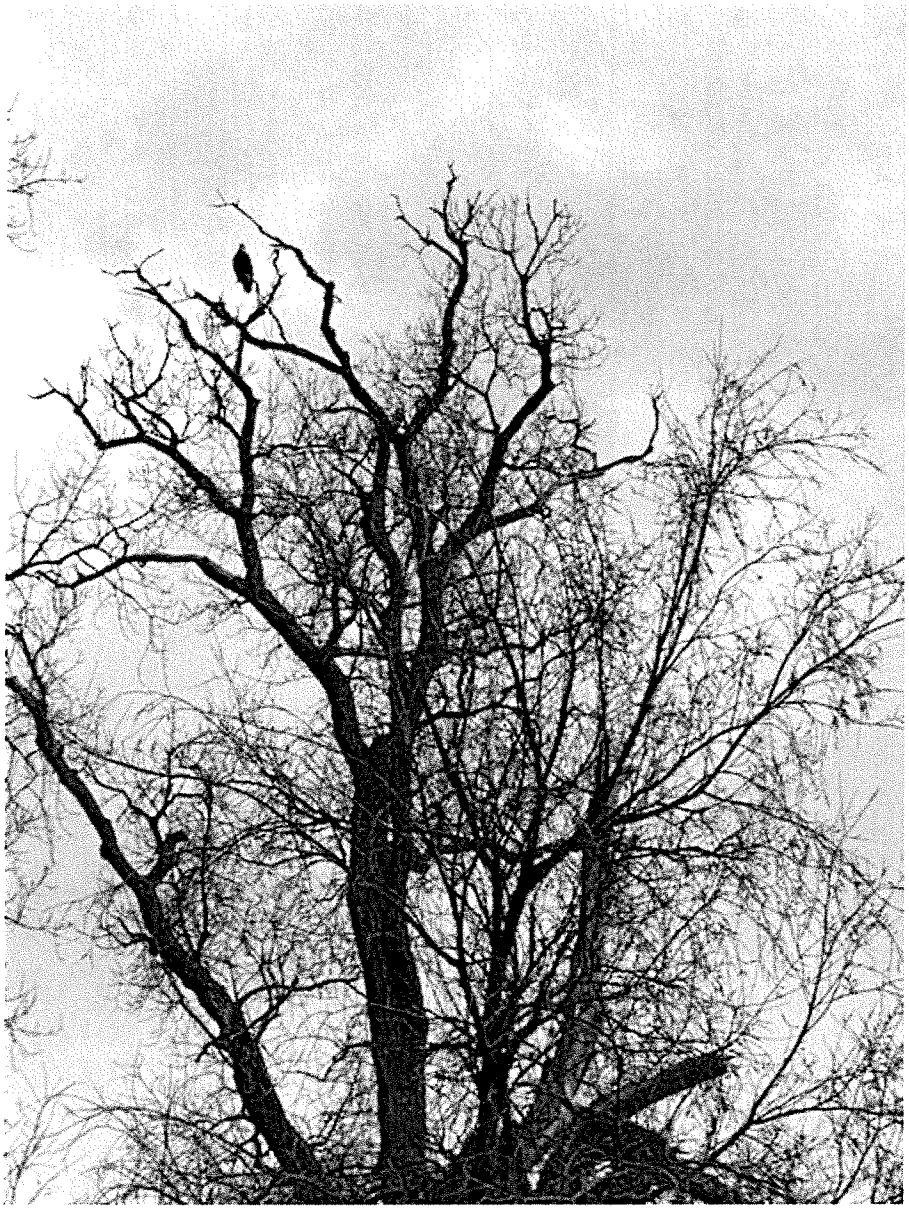
Pictured Above: Spawning Gar. The San Marcos River is home to an abundance of aquatic life that depends on a high level of water quality.

In addition to the aquatic life, many terrestrial animals depend on the San Marcos River for drinking water.



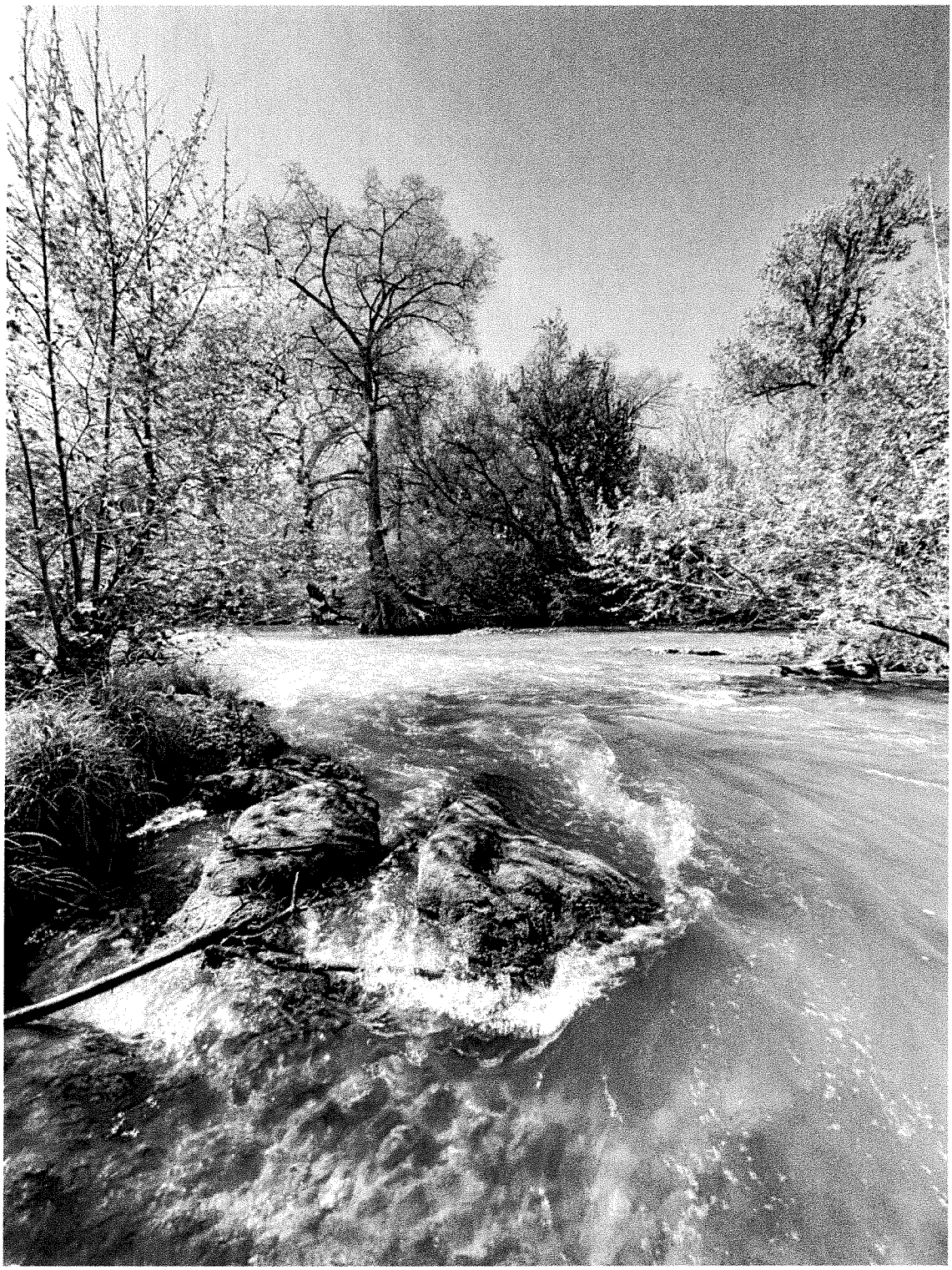
Pictured above: A Green Heron along the San Marcos River.

Pictured Above: Classic example of cows depending on the San Marcos River for their drinking water.



Pictured Above: A Bald Eagle along the San Marcos River. It's nest sits in an adjacent tree not pictured. Every year this pair has fledglings and the all depend on the San Marcos River. There are many endangered species in and along the San Marcos River.

Ecotourism on the San Marcos River is important to the local communities. The beautiful nature of the river is a draw for many.



The beauty and quality of the water in the San Marcos River is important for so many plants and animals on the river and should be protected.

Lori Rowe

From: PUBCOMMENT-OCC
Sent: Tuesday, April 12, 2022 11:36 AM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: WQ 0015918001 TRPA comments cont.

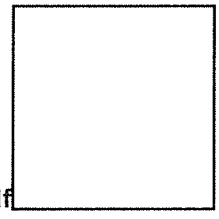
From: CHIEFCLK <chiefclk@tceq.texas.gov>
Sent: Tuesday, April 12, 2022 8:21 AM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: FW: WQ 0015918001 TRPA comments cont.

From: David Price <david@texasonsite.com>
Sent: Monday, April 11, 2022 8:45 PM
To: CHIEFCLK <chiefclk@tceq.texas.gov>
Subject: WQ 0015918001 TRPA comments cont.

Please see attached regarding need for water reuse.

Thanks.

David Price, P.E.
President
Texas Rivers Protection Assoc.
444 Pecan Park Drive
San Marcos, TX 78666



_HCA_NWF_One_Water_Report_FINAL_SinglePage.pdf

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Commissioner - City of Austin Water and Wastewater Comm. (1987-1990)

Member - One Water Alliance
President - Texas Rivers Protection Association

Lori Rowe

From: PUBCOMMENT-OCC
Sent: Tuesday, April 12, 2022 11:38 AM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: WQ 0015918001 TRPA comments cont.
Attachments: SBCA-Hill-Country-Sewage-Report-10.14.20.pdf

From: CHIEFCLK <chiefclk@tceq.texas.gov>
Sent: Tuesday, April 12, 2022 8:20 AM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: FW: WQ 0015918001 TRPA comments cont.

From: David Price <dprice@austexltd.com>
Sent: Monday, April 11, 2022 8:27 PM
To: CHIEFCLK <chiefclk@tceq.texas.gov>; dpaustex@gmail.com; Tom Goynes <tomgoynes@mac.com>; Victoria Rose <victoria@sosalliance.org>; David Price, PE <dprice@austexltd.com>; David Price <dprice@texasonsite.com>
Subject: WQ 0015918001 TRPA comments cont.

Chief Clerk:

Texas Rivers Protection Assocation, TRPA, adds the attached report pertaining to sewage treatment impacting rivers.

Respectfully,

David Price, P.E.
President
Texas Rivers Protection Association
444 Pecan Park Drive
San Marcos, TX 78666
512.698.7676

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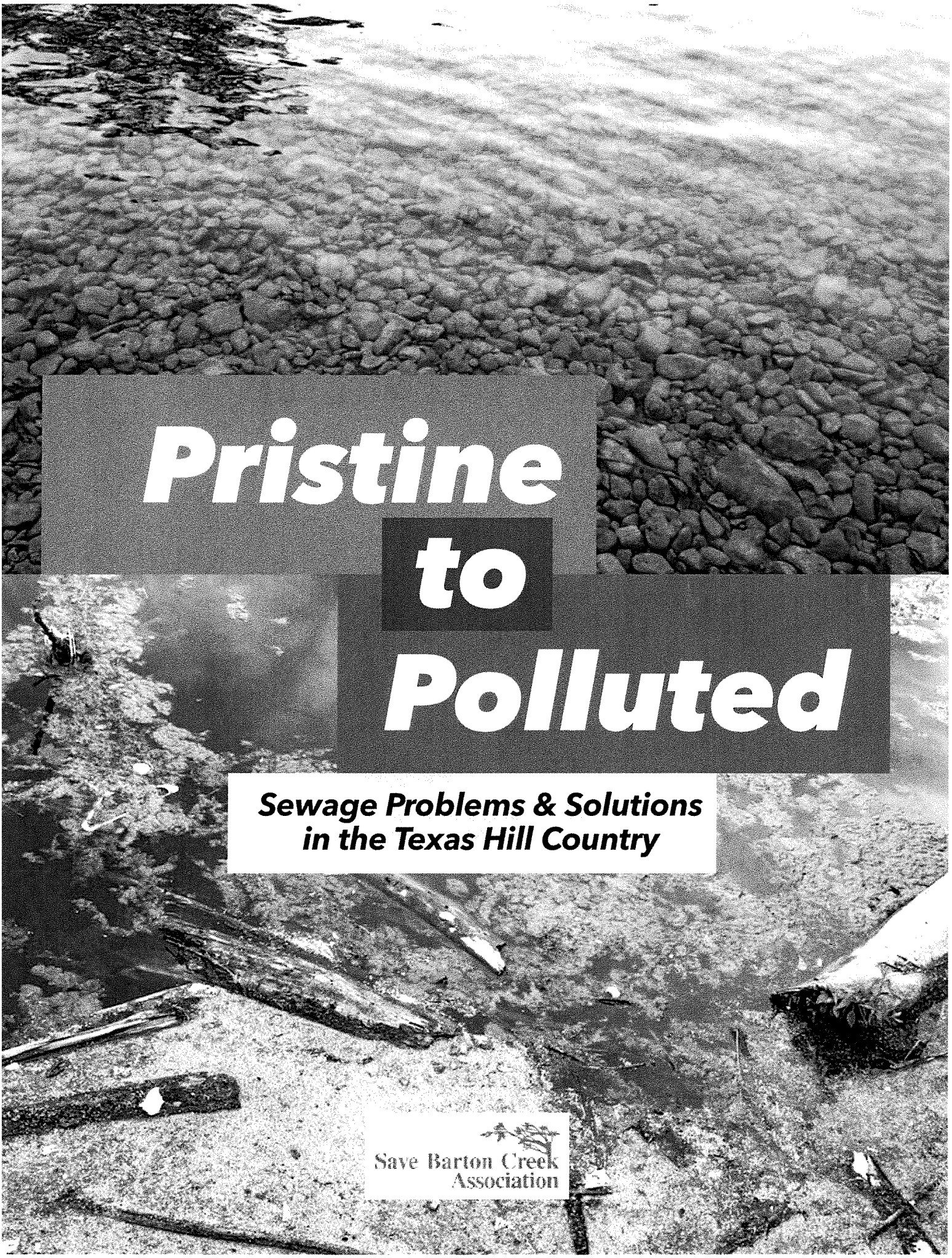


Pristine to Polluted

Sewage Problems & Solutions in the Texas Hill Country

Save Barton Creek Association

Pristine to Polluted

Sewage Problems & Solutions in the Texas Hill Country

October 2020

Brian Zabcik, author & designer
Nathan Wilton, maps & data
Angela Richter, SBCA executive director
Clark Hancock, SBCA board president

Contents

Acknowledgements

Save Barton Creek Association thanks The Cynthia and George Mitchell Foundation, for its support that made this report possible; Raymond Slade, for his assistance in developing and reviewing the report; Chris Herrington, for his technical review; Kelly Davis, Joe Day, and Aviva Rosenthal for their reviews and comments, and the partner organizations in the No Dumping Sewage coalition, including Save Our Springs Alliance, Greater Edwards Aquifer Alliance, Wimberley Valley Watershed Association, and Clean Water Action.

"During most of my life I have cherished the Hill Country, as have large numbers of my fellow Texans. Since well over a century ago, the region has been a sort of reference point for natives of other parts of the state, and mention of it usually brings smiles and nods. Not much of it is spectacular in the manner of high mountains and craggy seacoasts and such places, but we care about it — the dissected, elevated landscapes unlike the areas where most of us live, the un-Texas cool spring-fed streams, the fishing and hunting if we're inclined that way, the people and their towns and farms and ranches and their rather distinctive history."

— John Graves,
Texas writer

"If it were anywhere else in the country,
[the Hill Country] would be a national park."
— Frederick Steiner,
former dean of architecture, UT/Austin

INTRODUCTION

Executive Summary

The Hill Country has always been one of the most treasured parts of our state, both by the residents who live there and by the Texans who visit it for recreation. The region's allure lies not just in its unique terrain, but in its waterways. From the Colorado River to the San Antonio River, from Cypress Creek to Cibolo Creek, from Barton Springs to Comal Springs, these water bodies are some of the Hill Country's most popular features. In addition, the region is the location of two major underground reservoirs — the Edwards Aquifers, which supplies drinking water to 1.7 million people in the San Antonio area, and the Trinity Aquifer, which supplies water to many other Hill Country residents.

However, the Hill Country's streams and aquifers are facing a growing threat: sewage pollution. Some people may think that the treated sewage that comes out of a wastewater treatment plant is clean water. But only some pollutants are removed during treatment, while others are left in. Because the Hill Country's rivers and creeks often have low or sporadic flow, treated wastewater often makes up a large part of the stream volume below a treatment plant. This can harm both the streams, and the aquifers they replenish.

Dumping treated sewage into streams is regulated by direct discharge permits issued by the Texas Commission on Environmental Quality (TCEQ). Wastewater discharge caused fewer problems when the Hill County was lightly populated. But the number of people living in the region's 17 counties has been steadily increasing, from approximately 800,000 in 1950 to 3.4 million in 2015. By 2050 the area's population is projected to double, to 6.8 million.

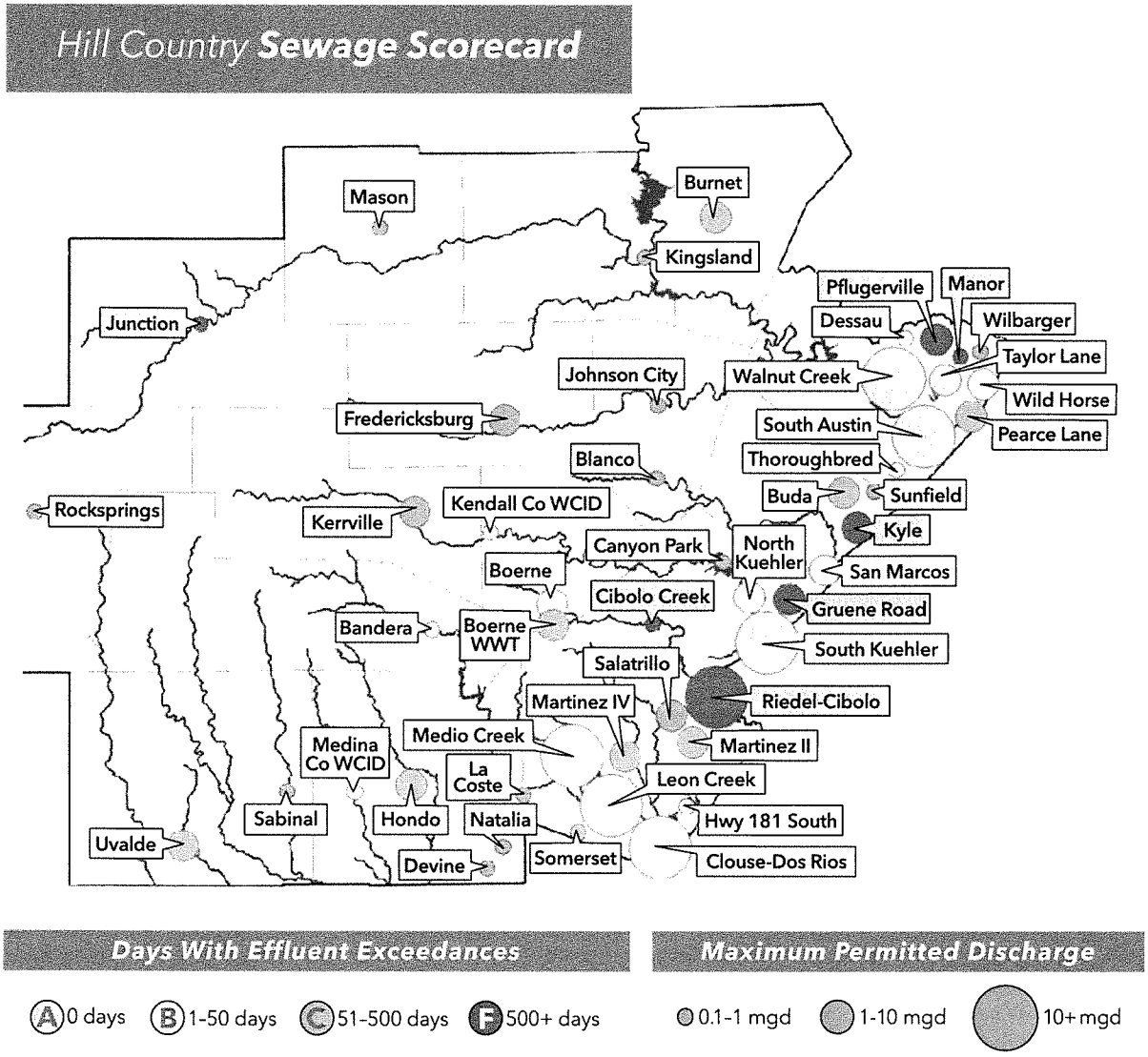
A larger population means more wastewater. Several new or expanded permits have been approved in recent years — some for direct discharge (dumping treated wastewater into streams and lakes), others for land application (irrigating treated wastewater on fields). TCEQ is currently considering applications for a new discharge permit on a tributary of Barton Creek below Austin, an expanded discharge permit on the Blanco River, and a land application permit on Honey Creek near Guadalupe River State Park.

For our Hill Country Sewage Scorecard, we examined pollutant monitoring data that was self-reported by the 48 municipal sewage treatment plants with discharge permits in the region's 17 counties. We found that during the past three-and-a-half years, 39 facilities exceeded at least one of the pollutant limits set by TCEQ in their operating permits. In other words, 81 percent of Hill Country sewage plants dumped something into a stream that wasn't allowed by their permit at least once since 2017.

The most common failures were for oxygen depletion and excess suspended solids (both of which can harm aquatic life), and E. coli bacteria (which can harm people). The key measurement used for this report was the total number of days with reported pollutant exceedances from January 2017 to 2020. During this period, 6 plants had 1-50 days with exceedances, 15 plants had 51-500 days, and 6 plants had more than 500 days. Only 6 plants had no exceedances.

And this was just for the sewage pollution that's regulated and reported. Because most discharge permits only contain monthly average limits for pollutants, some plants may have had high daily levels of pollutants that they didn't have to report.

Plus, only some pollutants are removed during sewage treatment, while others remain. Two of those pollutants, phosphorus and nitrogen, do the same thing in the water that they do on land: they help plants grow. Dumping inadequately treated sewage into streams can lead to large growths of algae. Known as blooms, these growths can cause oxygen depletion, which harms fish and other aquatic life. Some forms of algae also produce toxins that can poison people and



their pets. Algae has recently blanketed central Texas streams at locations below sewage facilities, including plants in Blanco and Liberty Hill.

Because existing plants are already problem-plagued, it's essential that new permits should be issued sparingly and with tight restrictions. Recommendations for policy changes and other actions are included in Chapter 5 of this report. Fewer discharge permits should be issued, pollutant limits should be lowered, and all wastewater permits should be required to use better treatment methods.

In lower-density developments, modern septic tanks and community-scale systems can provide decentralized wastewater treatment. In higher-density developments, dispersing treated sewage into the soil may be a better alternative than dumping it into streams. Treated wastewater is already being used to irrigate parks, golf courses, farms, and undeveloped fields in the Hill Country. All new developments should be designed to reuse treated wastewater for non-potable purposes such as watering lawns and flushing toilets. Reuse is key to implementing the One Water approach, which manages natural water, stormwater, and wastewater as different forms of the same resource in an integrated approach.

The Hill Country's population won't stop growing, which is why we need to prepare now for future growth. Better sewage treatment methods and more protective permits mean that wastewater can be transformed from a problem that pollutes our rivers and streams into a resource that helps conserve our best water for more important uses.

CHAPTER 1

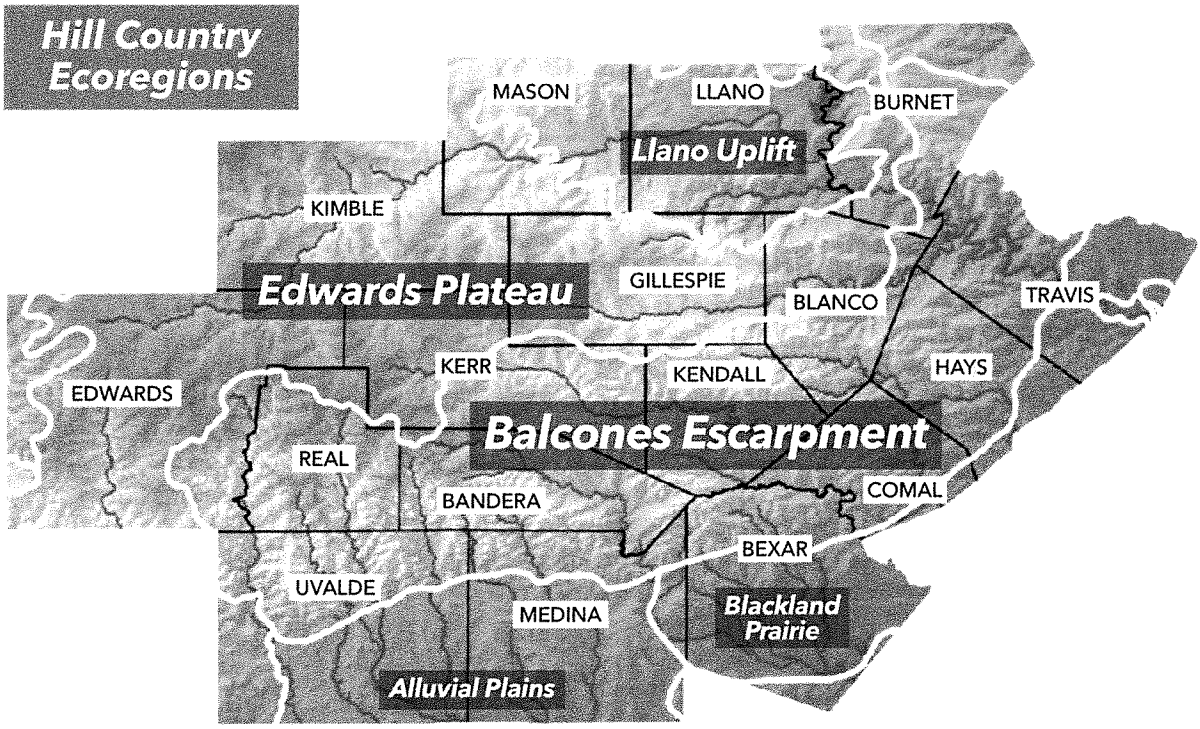
Land, Water & People in the Hill Country

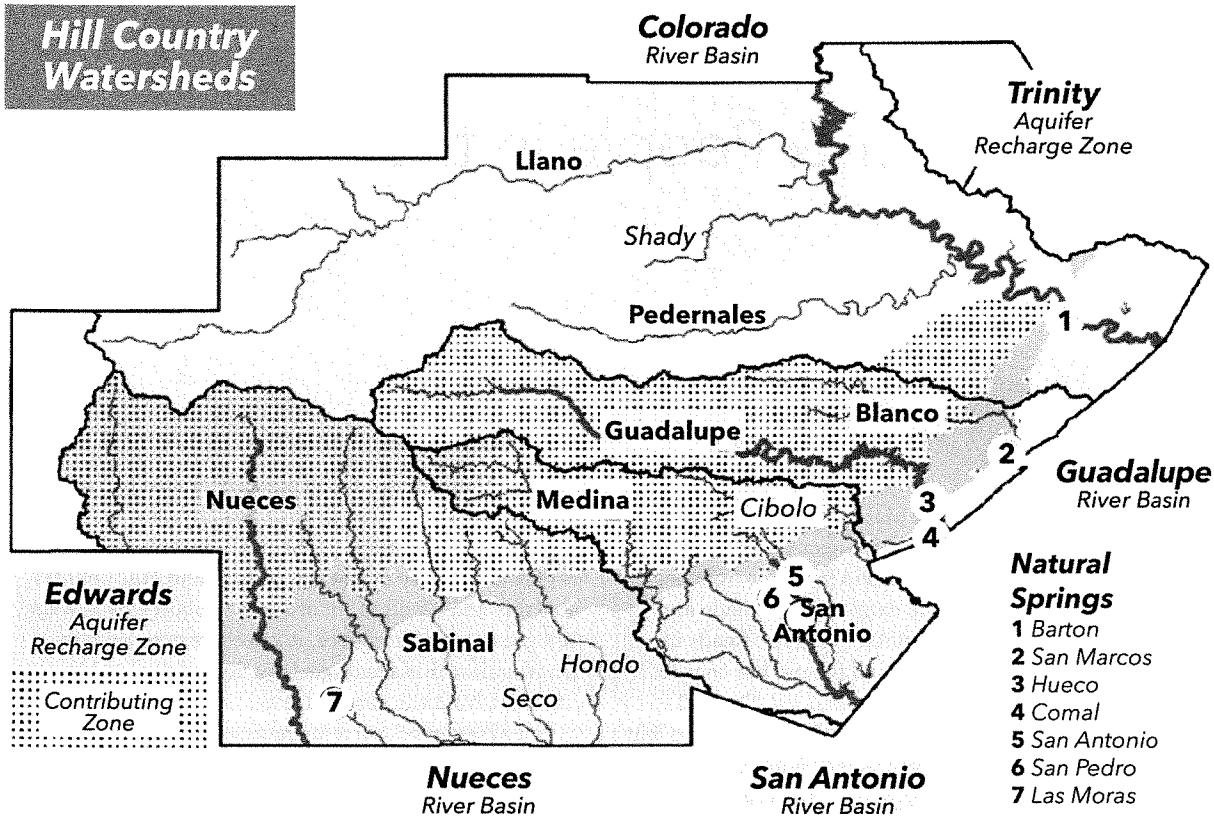
1.1 A Special Place

While our state has many places of great natural beauty, the Hill Country is the one spot that's truly special for many Texans. Views extend for miles from peaks and ridges, while valleys and canyons offer shade and seclusion in forests of oak and Ashe juniper. Roads in the region twist and turn, rise and fall as they connect small towns with rich immigrant histories. The Hill Country's allure lies not just in its unique landscape, but in its streams, lakes, and springs, which are some of the state's most popular recreation spots. In addition, the region is the location for two major aquifers which are important sources of drinking water.

However, the natural beauty and pristine waters of the Hill Country are being steadily eroded by new development. Population growth has changed the region in many ways, but one of the most worrying effects has been the increase of sewage pollution in Hill Country streams and aquifers. In order to explain why sewage is a greater problem here, it's necessary to explain what makes this area's geology, hydrology, and history different from the rest of Texas.

For this report, we're using the Hill Country Alliance's definition of the region as encompassing 17 counties, covering 17,760 square miles. Bexar, Comal, Hays, and Travis counties form the area's populous eastern border along Interstate 35. Gillespie, Blanco, Kerr, and Kendall counties make up what most people





think of as the heart of the Hill Country. Kimble, Mason, Llano, and Burnet counties form the region's drier and higher northern edge, while Edwards, Real, Bandera, Uvalde, and Medina counties on the southern edge have some of the area's most striking landscapes.

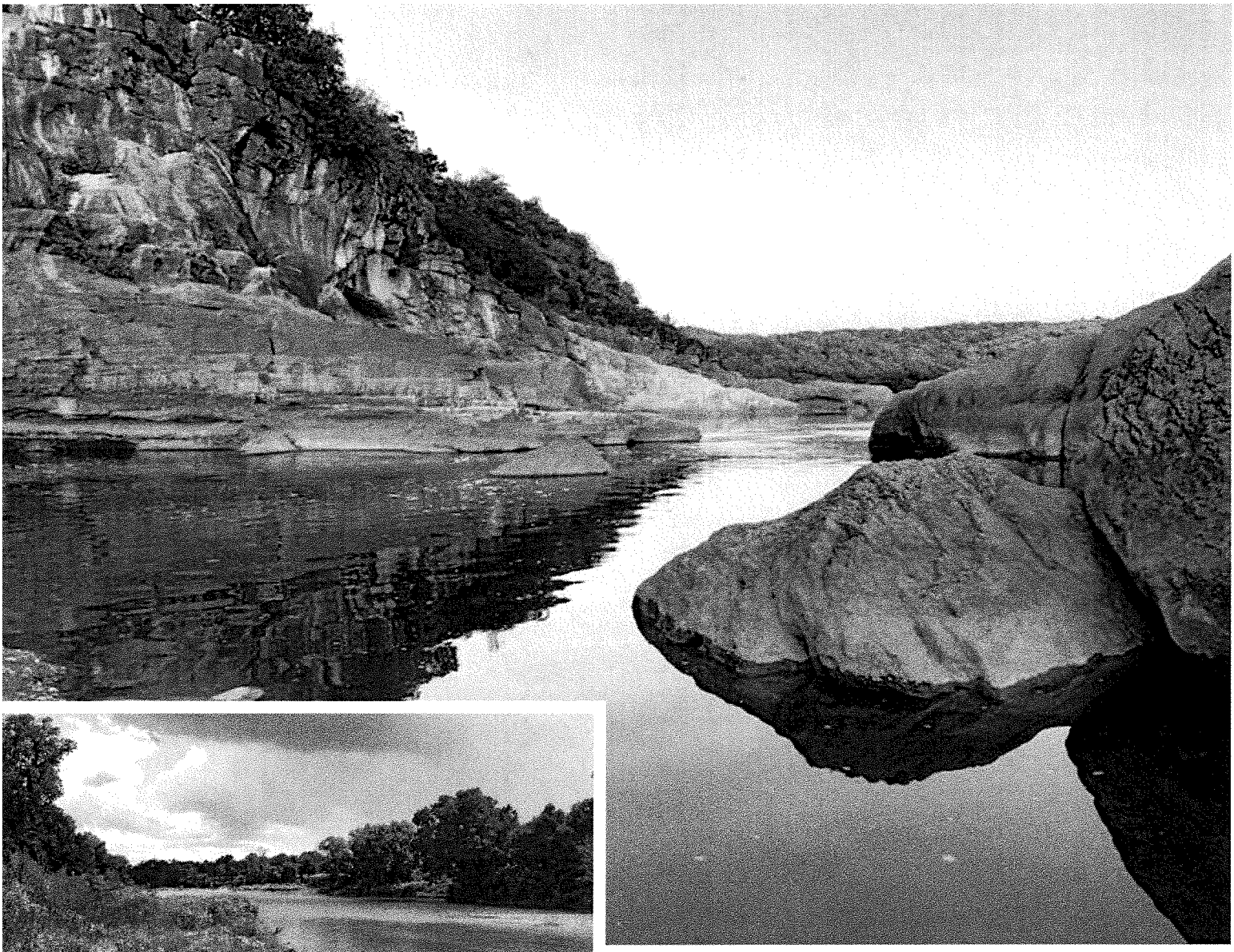
1.2 Geology & Hydrology

The region's unique nature starts with its geology. While most of Texas consists of flat plains, the Hill Country is a transition zone from a higher plain to lower ones — from the Edwards Plateau in the northwest, to the Blackland Prairie and Southern Texas Plains in the southeast. Elevations start at more than 2,400 feet in parts of the Edwards and drop down to 300 feet in some areas east of Interstate 35. Much of the decline takes place in the Balcones Escarpment, a wide geologic fault zone that's several miles wide and that curves along the southern and eastern edges of the Hill Country.

The Hill Country's terrain has in turn shaped its hydrology. Because of the region's elevation drop, water travels faster here than in the rest of the state. Erosion carved the region's valleys and canyons, and limited the build-up of topsoil on the limestone that forms the Edwards Plateau and Balcones Escarpment. While most streams in the rest of Texas meander through dirt channels covered with heavy vegetation, many Hill Country streams flow quickly through rocky banks that retain little or no water during dry months.

The rocky streams and thin soils have also contributed to the exceptional clarity of Hill Country creeks and rivers, which naturally have low levels of the nutrients (nitrogen and phosphorus) that can cause algae growths. But if treated sewage that has high levels of nutrients is dumped into the region's streams, algae growths can easily explode. The streams' clarity allows sunlight to penetrate to the bottom, fueling algae photosynthesis. The streams' rocky bottoms provide an ideal surface for algae strands to attach themselves. And because the streams naturally have low levels of algae, they also have low numbers of herbivores that can eat it when it starts growing.

Three major river systems dominate the Hill Country. The **Colorado River**, the longest to flow entirely in Texas, starts in the Panhandle and is enlarged by the Llano and Pedernales rivers in the Hill Country, as well as by several streams in the Austin area, including Barton, Onion, and Williamson creeks. The **Guadalupe River** and its tributary, the Blanco River, flow through the center of the Hill Country. The **San Antonio River** starts at the eastern edge of the Hill Country but is fed



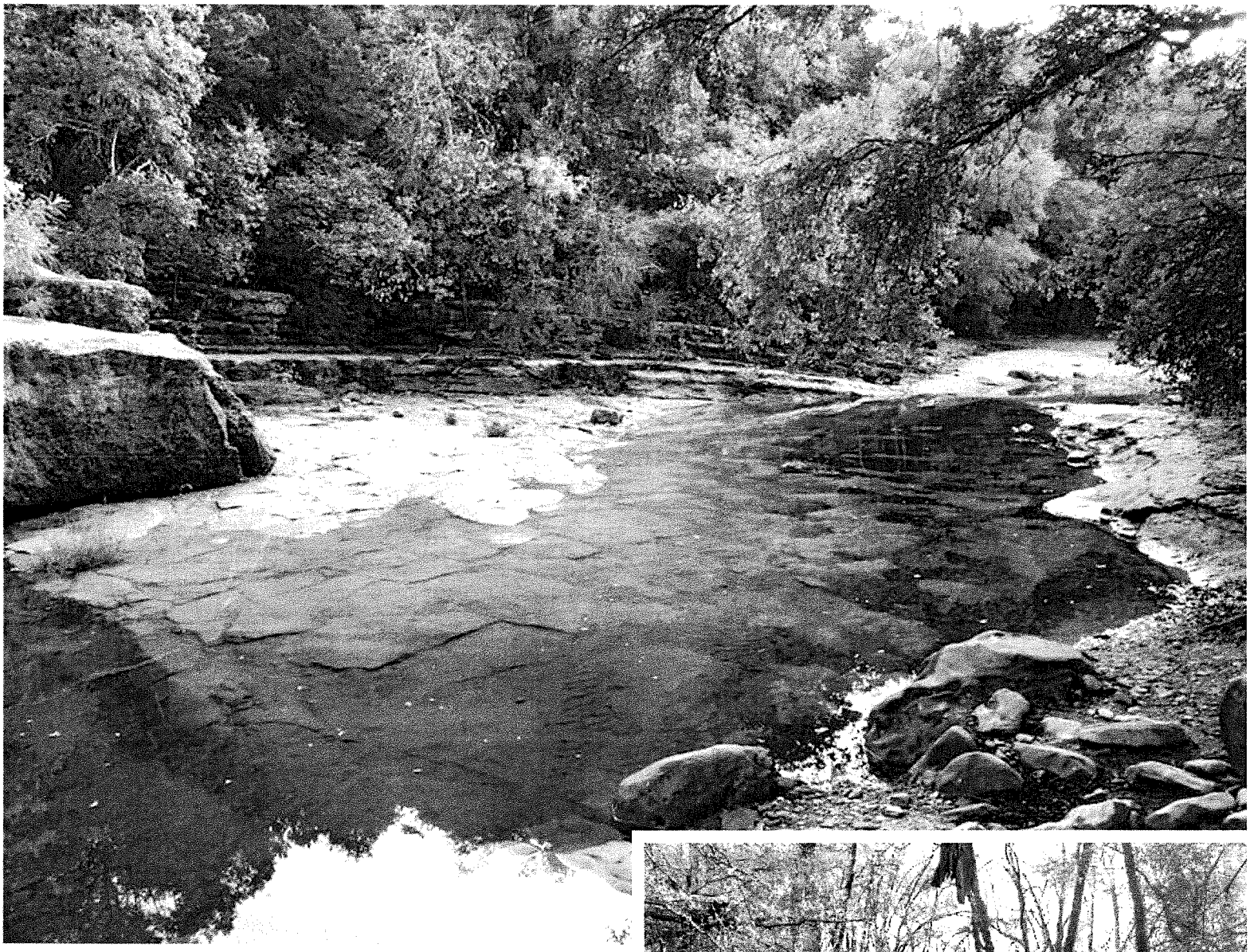
The Pedernales River (above, shown in Pedernales Falls State Park) offers a dramatic example of the limestone rock channels common to many Hill Country streams. By contrast, the Colorado River (left, shown at Columbus) has heavily vegetated soil banks, like many streams in the rest of Texas.

by streams that start higher up, including the Medina River and Cibolo, Leon, and Salado creeks. The Hill Country is also home to the headwaters of the **Nueces River** and several of its tributaries, including the Frio River and Hondo and Sabinal creeks.

1.3 Edwards Aquifer

Geology has also created one of the Hill Country's most distinctive water features — the Edwards Aquifer, a vast underground reservoir located roughly along the Balcones Escarpment that supplies drinking water for more than 1.7 million people. Most aquifers, such as the Carrizo-Wilcox to the east of the Edwards, hold water in buried layers of sand or clay. The Edwards, however, is made of karst — a unique form of limestone honeycombed with countless cracks, conduits, and cavities of all sizes, including several caverns.

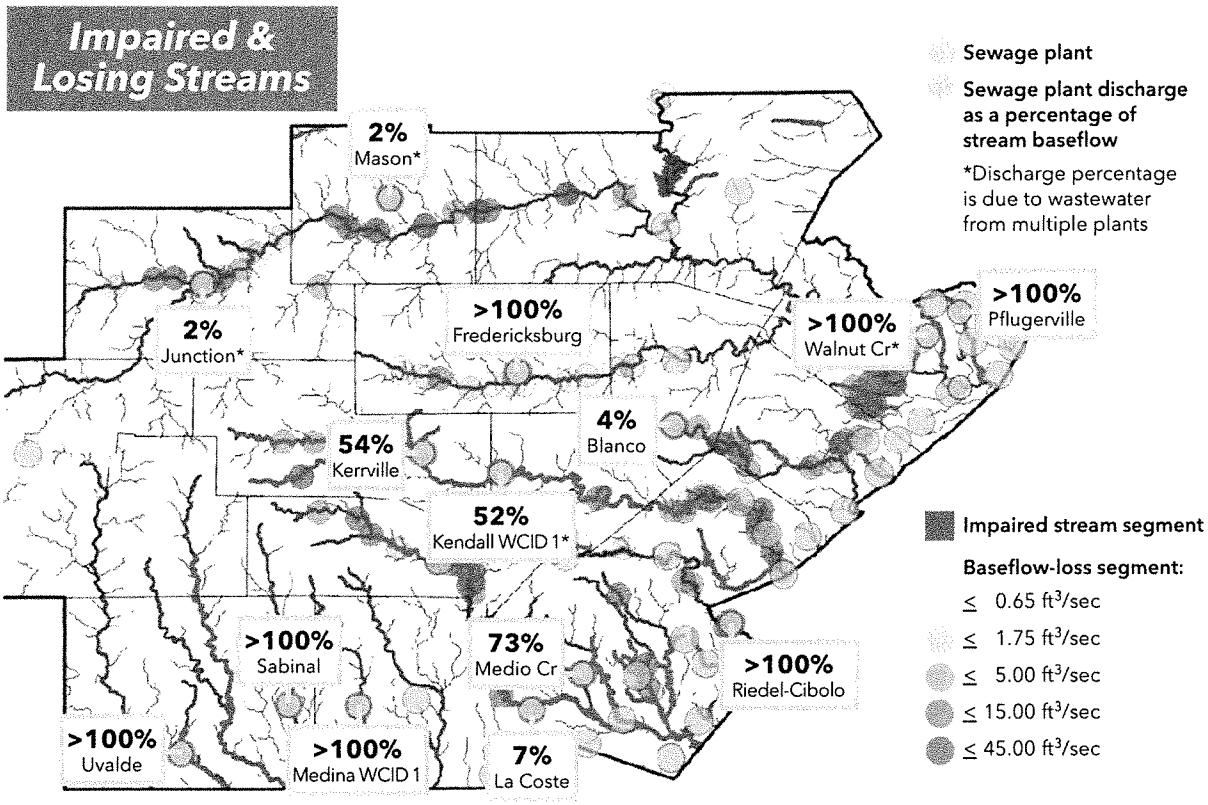
The limestone that forms the Edwards Aquifer is buried under other geologic layers in the northwestern part of the Hill Country, but it comes to the surface along the Balcones Escarpment. In this section, known as the Recharge Zone, surface water is able to seep directly into the Edwards Aquifer's capillary network of fissures and openings. (Recharge is the word used to describe how aquifers are refilled with water.) Streams will lose some or all of their water as they cross the Recharge Zone. For example, Helotes Creek in Bexar County disappears into a series of fractures in its stream bed, while Seco Creek is swallowed by a sinkhole in Medina County.



The limestone bed of Barton Creek near Austin (top) is typical of many Hill Country streams. Camp Creek (bottom), located in the Blackland Prairie east of Temple, has the soil banks common to many Texas streams. Soft banks with heavy vegetation can more easily assimilate water-borne pollutants than rocky channels.

Water pressure within the Edwards Aquifer forces water out of the ground in a series of artesian springs located downslope of the Recharge Zone, including Barton Springs in Austin, San Marcos Springs, and Comal Springs in New Braunfels. The aquifer has also been tapped by thousands of wells for drinking water — mostly by domestic wells in the region's rural areas that serve a single property, but also by municipal water supply wells. For decades, San Antonio was the largest city in the world to get all of its drinking water from an aquifer, and even today, it still gets 90 percent of its supply from the Edwards.

Water from the Edwards Aquifer is of remarkably high quality, but easily contaminated. Karst limestone doesn't filter out pollutants, unlike the sand and clay layers in most aquifers, and the conduits in karst may transmit contaminated water quickly to wells and springs. Pollution from sewage and other sources isn't just a threat in the Recharge Zone, but in the Edwards Aquifer Contributing Zone too. This is a much larger



Hill Country streams are especially susceptible to pollution because many water along their routes. In the western part of the region, this is usually due to surface evaporation. Over the Edwards Aquifer, it's generally due to water seeping into the Recharge Zone. The amount of water that's lost from the baseflow volume is measured by gauges at some locations. Gauges that show a drop in baseflow are shown in magenta on this map. In some places, the amount of treated wastewater discharged by a sewage plant may comprise a significant percentage of the baseflow at that location. The percentage can be caluculated for the locations shown on the map in green. In addition, some stream segments have been designated as "impaired" by TCEQ because regular water quality testing has shown that the level of some pollutants is higher than the limits set for that stream. Impairments are often caused by pollution from multiple sources, including stormwater runoff, industrial and agricultural wastewater, and municipal wastewater. Impaired segments are shown in purple on the map. (Data analysis by Raymond Slade)

area including all of the streams that drain into the Recharge Zone.

The quality of water that flows from the Contributing Zone to the Recharge Zone can substantially impact water quality the aquifer. Lauren Ross, an Austin-based engineer, explained this process in a 2011 report commissioned by Save Our Springs Alliance and Greater Edwards Aquifer Alliance: "A significant portion of the Edwards groundwater enters the aquifer through openings in the bottom of streams. Water to these stream bottoms is provided from their entire watersheds, which may stretch as far as 50 miles beyond the recharge zone boundary. These relatively large contributing watersheds gather rainfall runoff and then funnel it across stream bottom recharge features where the Edwards Limestone crops out."

In addition to the Edwards Aquifer, the Hill Country also contains part of the Trinity Aquifer, which extends north to the Red River. Hundreds of wells in the Trinity, many of them private, provide drinking water for thousands of Hill Country residents. The Hill Country portion of the Trinity Aquifer is also contained in karst limestone, meaning that it faces the same dangers from water pollution as the Edwards Aquifer.

1.4 History & Population

The Hill Country's rough and rocky terrain, combined with its general lack of reliable water sources, meant that it was sparsely populated for centuries. While Native Americans established communities elsewhere in what would later become Texas, the Hill Country was mainly a way-station for nomadic peoples, including the Apache, Comanche, and Tonkawa tribes. The first European settlements were all established in

the flatlands east of the Balcones Escarpment, and at locations with rivers and natural springs. San Antonio was founded in 1718 by Spanish colonists, Austin in 1837 by Anglo immigrants, and New Braunfels in 1845 by German immigrants.

After Texas became a state in 1845, more immigrants followed into the rest of the Hill Country, hoping to make a living from farming and ranching. The land, covered with thick carpets of native grass, looked promising at first. But the grass had taken root in the thin topsoil only over time. After settlers brought large herds of livestock into the Hill Country, most of the grass was grazed away within a matter of years. Soon much of the soil was gone too, washed away since it was no longer held in place by the grass.

The settlers remained, but the Hill Country remained a hard place to make a living, which discouraged further settlement. The region's population remained relatively stable for decades. But by the middle of the twentieth century, most Hill Country residents finally had access to paved roads, electricity, and reliable water. During this time, the rest of Texas was transitioning from a primarily rural and agricultural state to a more urbanized one. Since more Texans didn't have to make their living from the land, they could think about living in other places, and the beauty of the Hill Country made it a top draw.

As a result, the population of the 17-county Hill Country region has soared from approximately 800,000 in 1950 to 3.4 million in 2015. By 2020 the area's population is projected to double, to 6.8 million. The vast majority of this growth is taking place in the Austin and San Antonio metropolitan areas along the I-35 corridor. However, new development is expanding further west into the heart of the Hill Country. From Boerne and Bulverde in the south to Buda and Burnet in the north, small towns are turning into urban centers.

The Hill Country has historically never had to support a population this large, and the environmental damage is showing up in many ways. This report focuses on the growing problem of sewage pollution in the region. According to our review of the monitoring reports for Hill Country sewage plants, most facilities have been exceeding their pollution limits on a regular basis. In addition, the pollution limits that the state's environmental agency sets for Hill Country plants are generally the same as limits for facilities in the rest of Texas. Later in this report, we'll explain how sewage can be treated in better ways to protect the water in Hill Country streams and lakes.

CHAPTER 2

Hill Country Sewage Scorecard

2.1 Methodology & Results

As required by the federal Clean Water Act and the Texas Water Code, all sewage plants in the state that want to dump treated wastewater into natural water bodies must have a **discharge permit** approved by the Texas Commission on Environmental Quality (TCEQ). Permit enforcement starts with the plants themselves, which are required to regularly test the quality of treated sewage. Texas plants must include the test results in the monthly **discharge monitoring reports** that they have to file with the TCEQ, which forwards the data to the U.S. Environmental Protection Agency. The EPA then makes this information available to the public on its Enforcement and Compliance History Online (ECHO) website.

There are two main categories of discharge permits: Publicly Owned Treatment Works (POTW) and Non-POTW. The POTW category includes all sewage plants that are operated by cities, counties, and districts such as municipal utility districts (MUDs) and water control and improvement districts (WCIDs). The Non-POTW category includes plants that have been created for individual subdivisions, as well as a few for individual businesses.

Permits contain both a discharge limit and pollutant limits. The **discharge limit** is the maximum amount of treated sewage — called **effluent** — that a plant can dump into a stream, and is measured in million gallons per day (mgd). **Pollutant limits** define the maximum amount of specified pollutants that can remain in treated wastewater. In Texas, pollutant limits are usually set for oxygen levels, suspended solids, E. coli bacteria, ammonia nitrogen, pH level, and chlorine. Some permits also have total nitrogen and phosphorus limits. All permits have monthly average limits for pollutants, which are based on multiple tests of treated wastewater; some permits also have single-sample limits. If a test shows that the amount of a specific pollutant remaining in treated wastewater exceeds either a single-sample or monthly average limit, that is referred to as an **effluent exceedance**.

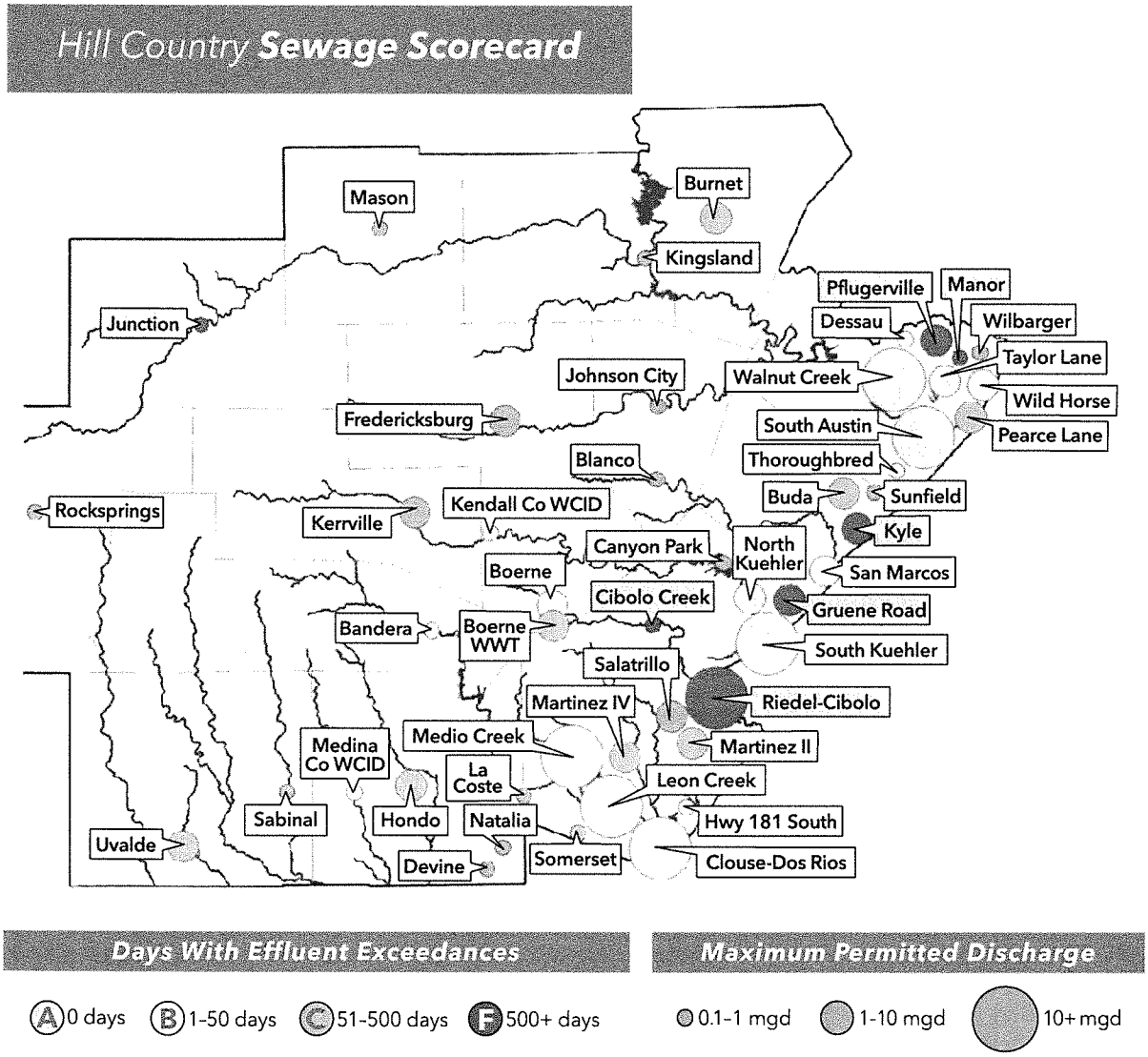
Highlights

In the Hill Country, **48** municipal sewage plants have discharge permits.

81% **have exceeded at least one pollutant limit since 2017.**

The average number of exceedances at all plants was **8.6**

All plants averaged 188 days with exceedances.



For this report, we analyzed data for all of the publicly owned sewage treatment facilities in the Hill Country Alliance's 17-county region that are permitted to discharge 0.1 mgd or more of treated sewage into a creek, river, or lake. In this report, we also refer to these facilities as **municipal sewage plants**. This report does not include publicly owned plants with discharge limits smaller than 0.1 mgd. Nor does it include privately owned plants, all of which have discharge limits below 0.5 mgd. While there has been a noticeable increase in new discharge permits issued for the Hill Country since 2000, the available online data for many smaller plants are incomplete or missing, making a reliable analysis impossible.

For the 48 municipal sewage discharge facilities in the Hill Country, we examined their self-reported data for the past three-and-a-half years, from January 2017 to June 2020. We looked at two key statistics: the **number of effluent exceedances** that plants reported during this period, and the **number of days with exceedances**. We found that publicly owned sewage plants in the Hill Country exceed their pollutant limits with disturbing frequency. Overall, 39 municipal plants out of 48 had at least one effluent exceedance since 2017. In other words, 81 percent of the region's sewage facilities have dumped something into Hill Country streams that they weren't supposed to on at least one occasion in the past three and a half years.

Not all plants are exceeding their permit limits at the same level, however. In order to make this easier to understand, we assigned grades to plants based on their number of days with effluent exceedances during

Hill Country **Sewage Scorecard**

COUNTY / FACILITY	EFFLUENT EXCEEDANCES GRADE	DAYS	NUMBER
BANDERA			
Bandera	**B**	28	2
BEXAR			
Martinez II	**A**	0	0
Martinez IV	**A**	0	0
Somerset	**A**	0	0
Clouse-Dos Rios	**B**	4	4
Hwy 181 S	**B**	33	5
Leon Creek	**B**	3	3
Medio Creek	**B**	4	4
Salatrillo Creek	**C**	71	13
Cibolo Valley	**F**	575	26
Riedel-Cibolo Creek	**F**	731	3
BLANCO			
Blanco	**C**	121	5
Johnson City	**C**	91	4
BURNET			
Burnet	**A**	0	0
COMAL			
North Kuehler	**B**	1	1
South Kuehler	**B**	1	1
Canyon Park Estates	**C**	91	4
Gruene Road	**F**	1,150	51
EDWARDS			
Rocksprings	**C**	122	4
GILLESPIE			
Fredericksburg	**C**	121	5
HAYS			
Buda	**A**	0	0
San Marcos	**B**	3	3
Sunfield MUD 4	**C**	60	3
Kyle	**F**	833	65

COUNTY / FACILITY	EFFLUENT EXCEEDANCES GRADE	DAYS	NUMBER
KENDALL			
Boerne WWT	**A**	0	0
Boerne	**B**	1	1
Kendall Co WCID 1	**B**	30	1
KERR			
Kerrville	**C**	93	8
KIMBLE			
Junction	**F**	1,119	52
LLANO			
Kingsland MUD	**C**	155	11
MASON			
Mason	**C**	303	19
MEDINA			
Hondo	**A**	0	0
Medina Co WCID 2	**B**	30	2
Devine	**C**	243	14
La Coste	**C**	120	4
Natalia	**C**	120	4
TRAVIS			
Pearce Lane	**A**	0	0
Dessau	**B**	29	2
S Austin Regional	**B**	2	2
Taylor Lane	**B**	30	1
Thoroughbred Farms	**B**	1	1
Walnut Creek	**B**	4	4
Wild Horse Ranch	**B**	32	3
Wilbarger Creek MUD 2	**C**	391	17
Manor	**F**	846	35
Pflugerville	**F**	1,372	22
UVALDE			
Uvalde	**A**	0	0
Sabinal	**C**	62	5

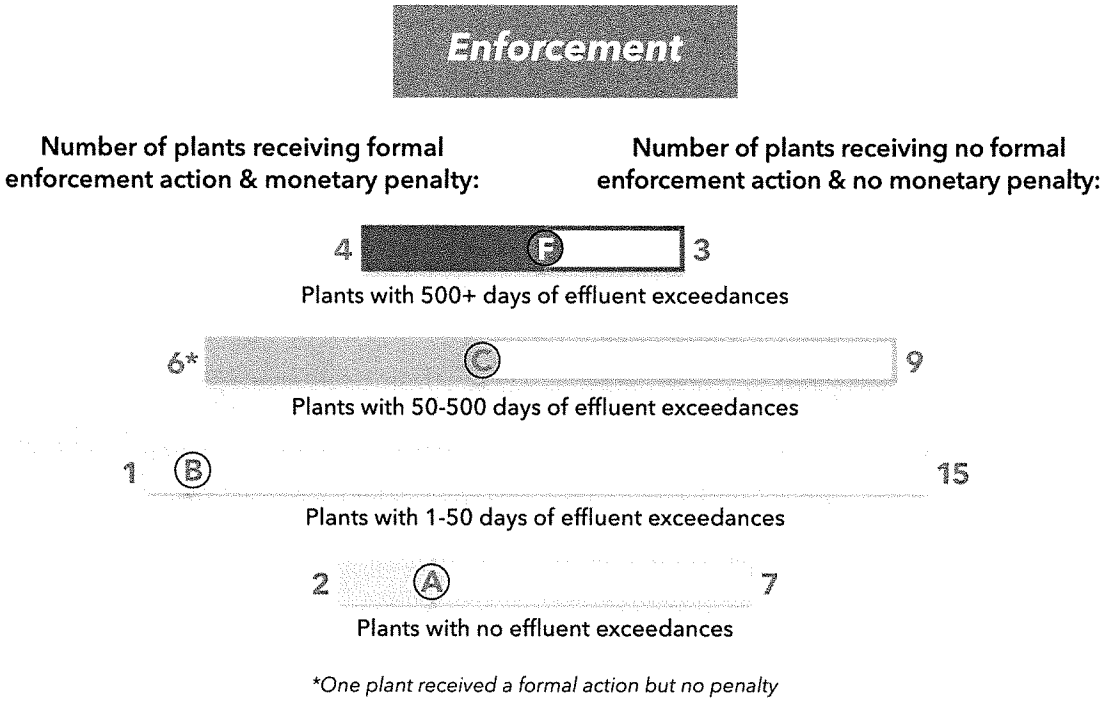
(No municipal sewage discharge plants are located in Real County)

the three-and-a-half-year study period: A = 0 days;B = 1-50 days; C = 51-500 days; F = more than 500 days

We also categorized plants by size based on their maximum permitted discharge, expressed in million gallons per day (mgd): Large: more than 10 mgd; Medium: 1-10 mgd; Small: 0.1-1 mgd.

Only 6 plants earned a grade of A on our chart — Boerne WWT (Wastewater Treatment & Recycling), Buda, Burnet, Hondo, Somerset, and Uvalde. These are small plants, with discharge limits ranging from 0.32 mgd to 2.44 mgd.

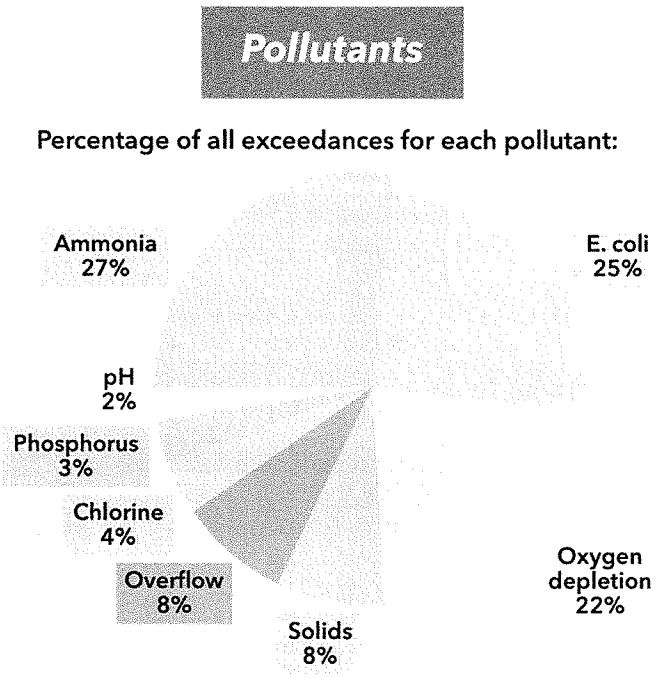
A total of 16 plants received a grade of B. This group includes the largest plants in our survey. South Austin Regional and Walnut Creek (Austin) have limits of 75



mgd and 100 mgd, respectively, while the Clouse (Dos Rios) and Leon Creek plants in San Antonio each have limits of 46 mgd.

A grade of C was given to 15 plants, mostly located in smaller towns. Several of the Hill Country's best-known towns received a C, including Blanco, Canyon Park Estates, Fredericksburg, Johnson City, and Kerrville.

Finally, 6 plants received a grade of F. This group includes two plants in the Austin suburbs of Manor and Pflugerville, one of New Braunfels' plants, and the Cibolo Creek plant north of San Antonio. The other two plants receiving an F, Junction and Mason, are on the northwestern edge of the Hill Country.



2.2 Enforcement Patterns

While sewage plants are required to do their own monitoring and reporting, TCEQ is still responsible for enforcing permits and making sure that plants comply with all regulations. The agency does this through on-site inspections, informal enforcement actions (phone calls and emails to discuss a problem), formal enforcement actions (official orders issued by the agency), and monetary penalties.

A review of enforcement statistics for Hill Country sewage plants shows that enforcement isn't always connected with effluent exceedances. In addition to the pollutant limits in their permits, plants must also com-

Enforcement & Pollutants

Publicly Owned Sewage Plant	Days With Exceedances	Penalities	Formal Actions	Informal Actions	On-Site Inspections	Ammonia	E.coli	Oxygen Depletion	Solids, flow, phosphorus, chlorine, pH
Pflugerville	1,372	$29,450	1	135	2		7		10 s, 4 f, 2 c
Gruene	1,150				4	9	4	38 c	1 s
Junction	1,119	$16,713	2	53	1		28	23 b	4 s
Manor	846			2	2	9	3	3 d	18 f, 7 p
Kyle	833	$184,013	2		2	32	18	4 c, 1 d	2 s, 9 c, 2 pH
Riedel-Cibolo Creek	731				2	1			2 f
Cibolo Valley	575	$14,500	1		1	8	1		17 p
Wilbarger Creek MUD 2	391				2	6	2	3 c	2 p, 4 c
Mason	303				1	17	1	1 c	
Devine	243		2	6	1	8	3		3 s
Kingsland	155						1	1	2 s, 3 p, 4 pH
Rocksprings	122	$4,500	1	1				4 d	
Blanco	121				1	2	1	1 d	1 f
Fredericksburg	121			9	2		4		1 s
La Coste	120	$12,375	1		1				4 f
Natalia	120			4	1	2		1	1 f
Kerrville	93	$6,375	2	25	2	4		4	1 pH
Canyon Park Estates	91	$1,073	1		2			1 d	2 s, 1 f, 1 pH
Johnson City	91	$6,250	1	16	2	2	2		
Salatrillo Creek	71				1	4	6		1 s, 2 f
Sabinal	62				1				4 s, 1 pH
Sunfield MUD 4	60				1			1	2 s
Hwy 181 South	33				1		2	6 c	
Wild Horse Ranch	32				1		2		1 f

ply with requirements in the federal Clean Water Act (CWA) and Safe Drinking Water Act (SDWA). In instances in which TCEQ faulted plants for CWA or SWDA compliance, it was often for filing delayed or incomplete monitoring reports. In other words, plants may be just as likely to get in trouble for paperwork problems as they are for releasing too much pollution into streams and lakes.

2.3 Common Pollutants

How are Hill Country municipal sewage plants exceeding the pollutant limits in their permits? Most exceedances were for **oxygen depletion**, which can be measured in three different ways. The first two measurements are for oxygen demand, which means how much oxygen will be consumed by substances remaining in treated sewage when it is discharged. High levels of organic matter will lead to the growth of aerobic bacteria in natural waters, which will consume more of the dissolved oxygen in those waters, leaving less for fish and other aquatic life. Oxygen demand can also be created by ammonia nitrogen, which is a byproduct of the sewage treatment process. Ammonia nitrogen is unstable and will react with dissolved oxygen in water to form another nitrogen compound, nitrite.

Biochemical oxygen demand (BOD) tests are used to measure the amount of oxygen that's consumed by both ammonia and by the aerobic bacteria which decompose organic matter. **Carbonaceous biochemical oxygen demand (CBOD)** tests are used to measure only oxygen consumed by the bacterial decomposition of carbon-based organic matter. Some Hill Country sewage permits require testing for BOD, while others specify CBOD. Some permits also require testing for the

Enforcement & Pollutants

Publicly Owned Sewage Plant	Days With Exceedances	Penalities	Formal Actions	Informal Actions	On-Site Inspections	Ammonia	E.coli	Oxygen Depletion	Solids, flow, phosphorus, chlorine, pH
Kendall County WCID 1	30								1 p
Medina County WCID 2	30				1	2			
Taylor Lane	30								1 s
Dessau	29						1		1 c
Bandera	28			4	1		2		
Clouse-Dos Rios	4				4	4			
Medio Creek	4				3		5		
Walnut Creek	4				2		3		1 s
Leon Creek	3				3		3		
San Marcos	3				1	1	2		
South Austin Regional	2	$52,187	3		2		1		1 c
Boerne	1				3				1 f
North Kuehler	1				1		1		
South Kuehler	1				1		1		
Boerne WWT		$17,601	1		2				
Buda				1	2				
Burnet									
Hondo					2				
Martinez II									
Martinez IV									
Pearce Lane					1				
Somerset									
Uvalde		$15,187	1		2				

amount of **dissolved oxygen (DO)** in effluent water.

It's important to remember that while these tests measure oxygen levels, the true pollutant that's being measured is organic matter — the amount of poop, food scraps, and other waste that still remains in sewage even after treatment. While some organic matter is always present in natural waters, adding too much of it to natural waters will trigger a destructive growth spiral of bacteria and algae that can disrupt a stream or lake's biology. (The harmful effects of organic-rich sewage on aquatic bacteria, algae, and oxygen levels is discussed in greater detail in Chapter 3.)

After oxygen levels, the next most common exceedances by Hill Country municipal sewage plants were for **total suspended solids (TSS)** and **E. coli** bacteria. High levels of suspended solids in treated sewage can make the natural water in streams and lakes less clear, which can harm aquatic life. Only a few strains of E. coli are harmful to humans, but its presence in water indicates that other disease-causing fecal bacteria, viruses, and microbes are likely present too.

Hill Country sewage plants also reported exceedances for chlorine, ammonia nitrogen, phosphorus, pH, and flow. Chlorine is used in the disinfectant stage at some treatment plants to eliminate bacteria, but if the chemical remains in the treated sewage that's released into streams, it can harm aquatic life. Only a few plants have limits for nitrogen or phosphorus, nutrients that can cause algae blooms. Aquatic life can be harmed by changes in a stream's pH level.

A **flow exceedance** means that a plant released a greater total volume of sewage than its permit allows. This sometimes happens when a plant is overwhelmed with water from storms or floods. In the worst-case scenario, a plant may release raw sewage that hasn't been treated.

CHAPTER 3

The Evolution of Sewage Treatment

3.1 Natural Stream Biology

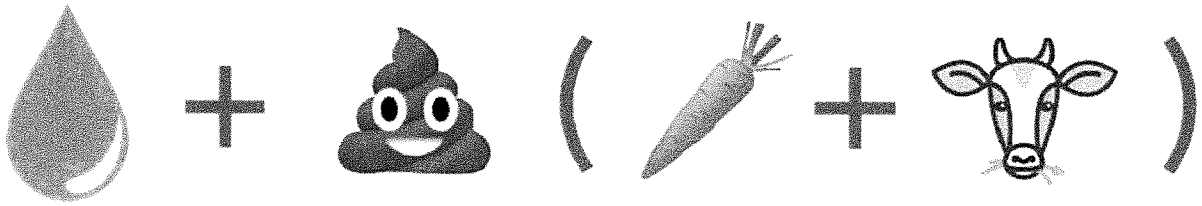
Some people may think that treated sewage is "clean enough" to be dumped into natural waters. In order to understand how even treated sewage can still harm streams, we need to know what rivers and creeks are like in their natural state.

When we see a stream that looks pristine and untouched by human activity, we may say that the water is "pure." But stream water isn't just composed of H2O and nothing else. It's full of life, and equally important, it's full of the compounds necessary to sustain life. The life that we most associate with streams are fish, but they're only the top level of an aquatic food pyramid that starts with bacteria and algae at the base. **Bacteria** break down plant and animal matter into compounds that fuel the growth of **algae**, which produce plant matter consumed by many animals.

Bacterial decomposition is the essential process by which old life becomes new life. In streams, bacteria break down plant matter, from algae and grasses to leaves and branches, as well as animal matter, usually from wildlife poop washed into the water by rain runoff. All plant and animal matter is referred to as organic matter, which means that it's made of carbon-based compounds. The organisms that break down organic matter are called aerobic bacteria, be-

The clear waters of Hill Country streams like the Frio River teem with aquatic life, both seen and unseen. (Photo: T.L. Langford)

What's in sewage?



Water & poop (plant & animal matter, i.e., organic matter)

cause they use oxygen as fuel.

Aerobic bacteria are present in both the soil, where they use atmospheric oxygen, and in natural waters, where they use dissolved oxygen. Some dissolved oxygen comes from aquatic plants, and some of it comes from oxygen in the air that comes into contact with the surface of a stream or lake and is absorbed into the water. Dissolved oxygen is used not just by aerobic bacteria, but by all of the animals that live in the water, from worms to crustaceans to fish. Aerobic bacteria break down organic matter into carbon dioxide, nitrogen, and phosphorus — the building-block chemicals that help all plants grow, including algae.

We generally only notice algae when it's grown into thick mats on the surface of streams and lakes, but microscopic algae particles are always present in natural waters. Like land-based plants, algae consume carbon dioxide, using the carbon to make new plant matter and releasing the oxygen as a byproduct. (Some studies estimate that up to half of the oxygen in our atmosphere comes from algae.) And like plants, algae consume **nitrogen** and **phosphorus**, which are also two of the main components of the fertilizers we use for lawns, gardens, and farms. Nitrogen and phosphorus are often referred to as **nutrients**, since they nurture the growth of plants.

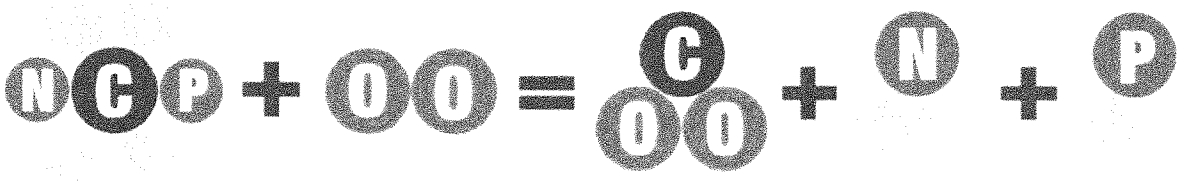
The problem with dumping treated sewage into streams and lakes is that it contains the same components as natural water, but in very different proportions. Sewage with high levels of organic matter and nutrients can throw a stream's life cycle out of balance. The growth of bacteria and algae can go into overdrive, while other forms of aquatic life suffer.

The basic way to treat sewage is to use bacterial decomposition in a controlled setting, which can take place either in water or on land. In sewage treatment plants, aerobic bacteria is used to break down organic matter in treatment tanks before the wastewater is released into streams and lakes. In contrast to this water-based method, land-based methods such as septic tanks and irrigation fields will release treated sewage into the soil, where bacteria, plants, and sunlight can break down more waste.

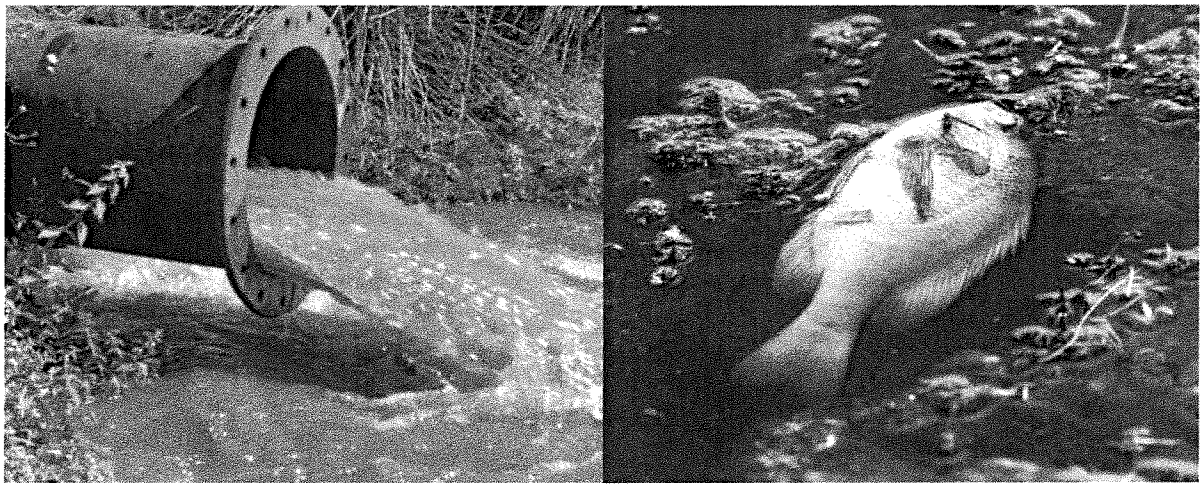
3.2 Water-Based Sewage Treatment

The history of how sewage treatment has evolved is a history of how our knowledge of sewage pollution has evolved. The first problem to be recognized was the one that could most easily be seen and smelled — sewage was dirty and stinky. For most of human history, the amount of sewage that people produced was comparatively small. In rural areas, it could be dumped onto the ground or into streams with little problem. In urban areas, sewage was collected in cesspits that allowed

Aerobic bacterial decomposition



Organic matter (Carbon etc) + Oxygen = Carbon dioxide + Nitrogen + Phosphorus



Dumping raw sewage – or even treated sewage with high levels of organic matter – into streams can deplete dissolved oxygen in the water, which can lead in the worst-case scenario to fish kills.

solid waste to settle to the bottom as sludge. Several cultures, from the Indus Valley and Roman Empire to the Islamic Caliphate and the Aztecs, constructed early systems that relied on water to wash away waste.

The amount of sewage that people produced increased dramatically with the construction of the first large-scale water supply systems in the 1700s. People could now use much more water in their homes, and one of the new uses was for the modern flush toilet, also developed around the same time. Because very large amounts of water were being mixed with small amounts of poop and other waste, more contaminated water had to be dumped somewhere. Flush toilets were the game-changer that created a problem we've been trying to solve ever since.

London was the first city to install water supply systems and household toilets on a widespread scale, which was also why it was one of the first cities to experience severe wastewater problems. Sewage with disease-causing microbes seeped into wells and other sources of drinking water. After a wave of cholera outbreaks in the mid-1800s, London constructed the first modern sewer system to pipe wastewater away from homes and discharge it into streams and rivers.

But dumping large quantities of raw sewage into streams created a new problem. Almost all of the solids in sewage — especially poop and food scraps — are organic matter. If this waste is dumped directly into streams, aerobic bacteria suddenly have a lot more food. And like any species with a bigger food supply, they reproduce more. More bacteria also consume more dissolved oxygen, leaving less for other aquatic animals. Fish kills next to sewage outlets were one of the first signs that something was wrong — the fish were dying of suffocation.

In the late 1800s, scientists began developing tests to measure **biochemical oxygen demand (BOD)** — how much oxygen is "demanded," or consumed, by substances in the water sample. Water with high levels of organic matter will also lead to high levels of aerobic bacteria growth, leading to high BOD levels. In 1912, an English commission set maximum allowable amounts for oxygen demand and suspended solids in sewage before it could be dumped into streams. These standards, the first to be internationally adopted, reinforced the need for sewage to be treated in order to remove some of its pollutants.

The first modern sewage treatment plants used the same basic principle as cesspits – sewage was collected in a chamber so that solid waste could sink to the bottom. The sludge at the bottom can be removed to be used as fertilizer, while the oil and grease that collects on top can be skimmed off for soap-making. This stage of sewage treatment is now referred to as **primary treatment**. Sewage that's gone through this basic process may look and smell cleaner. But while primary treatment can remove up to 90 percent of suspended solids in wastewater, it generally only reduces oxygen demand by around 50 percent. That's because the treated sewage still contains a lot of dissolved organic material that isn't visible to the naked eye.

During the late 1800s, engineers worked on ways to improve sewage treatment and reduce oxygen demand. The solution was to use aerobic bacteria, which can decompose organic matter anywhere with the right conditions — not just in streams. Engineers found that if they took sewage that had already gone through primary treatment and passed it through another stage

to encourage the growth of aerobic bacteria, they could break down more organic matter. This process, now known as **secondary treatment**, has been refined and can reduce the levels of oxygen demand in treated wastewater by 85-90 percent.

An additional benefit of secondary treatment is that it can reduce the amount of **E. coli bacteria** and other forms of fecal microbes in sewage. These organisms live in the lower intestines of humans and other mammals, where they perform useful roles in the digestive process. But if people drink water from sources contaminated with fecal microbes — or if they accidentally swallow contaminated water while swimming or wading in polluted streams and lakes — they can develop gastrointestinal illnesses.

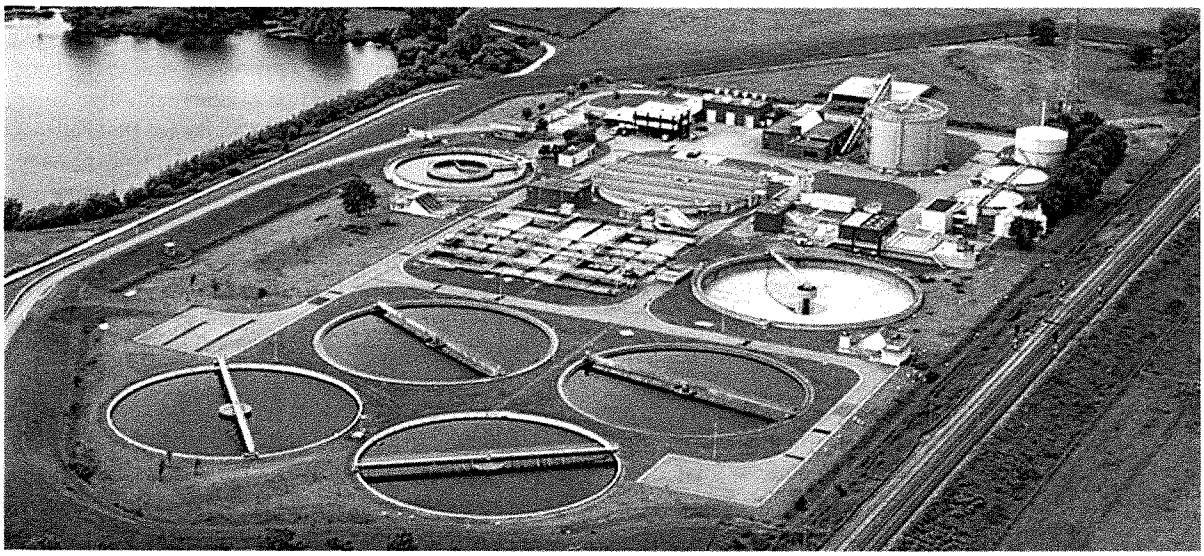
E. coli bacteria was first identified in 1885, and the first test for the presence of E. coli in water was developed six years later. Subsequent variations of this test have become a standard feature of water quality testing, since the presence of E. coli may indicate that other disease-causing fecal microbes are also present in the water. Primary and secondary treatment combined can reduce the amount of E. coli in sewage by 90-99 percent.

While bacteria is useful in secondary treatment, it can be harmful if it's still in treated sewage that's dumped into streams used for recreation. That's why all sewage plants use a **disinfection treatment** at the end to kill off all bacteria, both the bad kind and the good kind. The most common disinfectant has been chlorine, but too much chlorine in discharged sewage can harm aquatic life, which is why it's also necessary to reduce chlorine levels prior to discharge for larger wastewater treatment plants. Some newer treatment plants use alternative disinfection treatments such as ultraviolet light or ozone to eliminate bacteria.

3.3 Contaminants of Emerging Concern

Oxygen levels, suspended solids, and E. coli were established as indicators of sewage pollution only after many years of observation and research. In recent decades, we've learned about other pollutants that can remain present even in sewage that's gone through primary and secondary treatment. The problem that's received the most attention recently in central Texas is nutrient pollution, which refers to high amounts of nitrogen and phosphorus that remain in treated sewage. Nutrient pollution is discussed at greater length in Chapter 5.

Recent studies have also exposed the effects of pharmaceuticals, endocrine-disrupting chemicals, and other **contaminants of emerging concern** in sewage. According to the Water Quality Association, up to 90 percent of oral drugs will pass through the body (meaning that the body doesn't absorb most of the dosage), and end up in sewage. Some people also flush unused medication down the toilet. Multiple research studies have shown that anti-depressant medication in natural waters can affect aquatic life, often reported in news stories as "fish on Prozac." Personal care products such as soaps, cosmetics, and shampoo that are rinsed down the drain while show-



Sewage treatment plants use aerobic bacteria to decompose the organic matter in wastewater – the same process that takes place in natural water bodies.

ering and bathing can also be harmful.

Research has additionally been conducted on the effects of endocrine disruptors in natural waters. This term refers to chemicals that can interfere with an organism's endocrine system and affect normal hormonal functions, which can lead to developmental, reproductive, neurological, or immune system damage. Endocrine disruptors include both natural and artificial hormones, as well as industrial chemicals such as bisphenol-A, better known as BPA. Several studies have found intersex fish (having both female and male characteristics) in locations near sewage outlets.

In 2019, researchers with the U.S. Geological Survey (USGS) published the first nationwide study to assess how often emerging contaminants show up in water from underground aquifers. Overall, the study found that contamination by pharmaceuticals and hormones wasn't widespread, and when they did show up, they generally weren't at levels that could harm human health. While the study tested for the presence of hundreds of substances, only 34 compounds were detected. The most frequently detected compounds were BPA, three pharmaceuticals (carbamazepine, sulfamethoxazole, and meprobamate), and a caffeine byproduct.

However, the USGS researchers also reported that emerging contaminants were more likely to be found in some locations than others. Detection frequencies were higher for water drawn from domestic wells (15 percent) than for public-supply wells, and for wells on aquifers with faster recharge (9 percent) than slower recharge (4 percent). Detection frequency was highest for sites located in areas with mixed land use (11 percent) followed by urban land use (6 percent), undeveloped (5 percent), and agricultural (3 percent). The study also analyzed detection frequency according to types of aquifers. Water from aquifers in crystalline rock formations with fractures had detection frequencies that were twice as high (16 percent) as aquifers in other formations such as sand and clay (0-8 percent).

All of these characteristics — domestic wells that pump drinking water from a quickly recharging aquifer in a fractured rock formation, and located in a region dominated by mixed land use — are true of the Hill Country. This suggests that the Edwards Aquifer could be especially susceptible to pollution by pharmaceuticals, hormones, and other emerging contaminants. In 2010, the US Geological Survey tested Barton Springs and the creeks feeding Barton Springs for wastewater indicator compounds. Twelve of the 59 compounds tested were found in at least one sample, although the concentrations were low. The insect repellent DEET was found in 42 percent of samples, and caffeine was found in 21 percent of samples. Even without discharge, these wastewater indicator compounds are being detected in creeks and in groundwater.

3.4 Land-Based Sewage Treatment

Municipal sewage plants serve approximately 80 percent of all Texas households. The remainder of the population is served by a variety of sewage management options, most of which disperse sewage onto the land rather than into water. In each of these options, sewage still goes through treatment to remove solids and organic matter before being discharged into the soil, where bacteria, plants, and sunlight can break down remaining waste. Land dispersal methods differ in scale and size, as well as the type of land that receives the treated wastewater.

Septic tanks and other decentralized treatment methods are known as **on-site sewage facilities (OSSFs)**. Most homes in rural areas use septic tanks. Modern systems have two chambers — the first lets solids sink to the bottom, while the second lets bacteria decompose organic matter. Wastewater then flows out of the tank and into a perforated pipe buried in a drain field composed of sand or gravel and overlaid with soil and grass. A **clustered on-site system** will serve several homes or businesses, each with their own septic tank for primary treatment. Wastewater is then pipe to a small shared facility for secondary treatment before being dispersed into a drain field.

Using wastewater for **irrigation** (also called **land application**) is increasingly common for subdivisions located in regions with strict rules against dumping treated sewage into streams or lakes. Sewage from multiple houses is piped to a central treatment facility and then sprayed or dripped onto parks, athletic fields, golf courses, agricultural fields, or undeveloped lots that only received wastewater.

3.5 Wastewater Reuse

Wastewater reuse is one of the newest sewage management options, as well as the one with the most potential for expansion in the future. It's based on the fact that water is used in homes and buildings for different purposes. The highest-quality water (called potable water) is needed for drinking and bathing, but isn't necessary for flushing toilets or irrigating lawns. Wastewater that's been treated to a lower standard than is needed for drinking or potable water uses can often be sufficient for these lower-priority, non-potable uses. Some reuse facilities are on-site, serving a single house or subdivision like greywater systems. A number of cities have begun building large-scale reuse systems in which wastewater is treated at a central plant and then piped back to homes and buildings through a dif-

Reclaimed water is used for a wide variety of purposes in Austin, including landscape irrigation at Mueller Lake Park.

ferent set of plumping. Centralized reuse systems are sometimes referred to as **recycled water** or **reclaimed water systems**. Purple pipes and fixtures are often used to prevent accidentally cross-connecting potable water systems to reclaimed water systems.

The final frontier for wastewater is to treat it so thoroughly that it can be reused for drinking water. This isn't hypothetical — it's already being done, and in Texas. The town of Big Spring in west Texas was the first community in the United States to install equipment for what's called **direct potable reuse (DPR)**. Wichita Falls temporarily operated a similar facility, while El Paso, Brownsville, and San Angelo are in the planning phase. DPR facilities use extremely fine membranes and filters to trap virtually all pollutants, producing purified water that's as clean as drinking water drawn from natural sources.

In addition to being a better way to manage wastewater, reuse also helps with water conservation, since it reduces demand for high-quality raw water to be withdrawn from rivers or aquifers and can keep treated, potable water from being used for non-potable uses like landscape irrigation. Reuse is a key component of **One Water**, an integrated approach that manages drinking water, natural water, stormwater runoff, and wastewater as different forms of the same resource, rather than as separate problems requiring separate approaches.

CHAPTER 4

The Evolution of Sewage Regulation

4.1 Role of the EPA & TCEQ

The evolution of sewage treatment has been accompanied by an evolution of the laws and regulations for sewage treatment. The federal Clean Water Act, which became law in 1972, established a regulatory framework for water pollution from all sources — not just municipal wastewater, but also industrial and agricultural wastewater. The key goal of the act is that all major water bodies in the U.S. should be safe for swimming and fishing and that no new discharges could occur without a permit.

The federal Environmental Protection Agency, also established in 1972, has implemented the Clean Water Act in part through the National Pollutant Discharge Elimination System (NPDES). The EPA first sets water quality standards, which are maximum limits for the amount of selected pollutants that can be present in natural water bodies. Only three measurements are applied in all places nationwide — dissolved oxygen (DO), suspended solids, and E. coli bacteria.

The EPA is also in charge of implementing the federal Safe Drinking Water Act, which became law in 1974. The agency issues drinking water standards, which set maximum limits for more than 90 contaminants, including microorganisms, disinfectants, inorganic and organic chemicals, and radioactive substances.

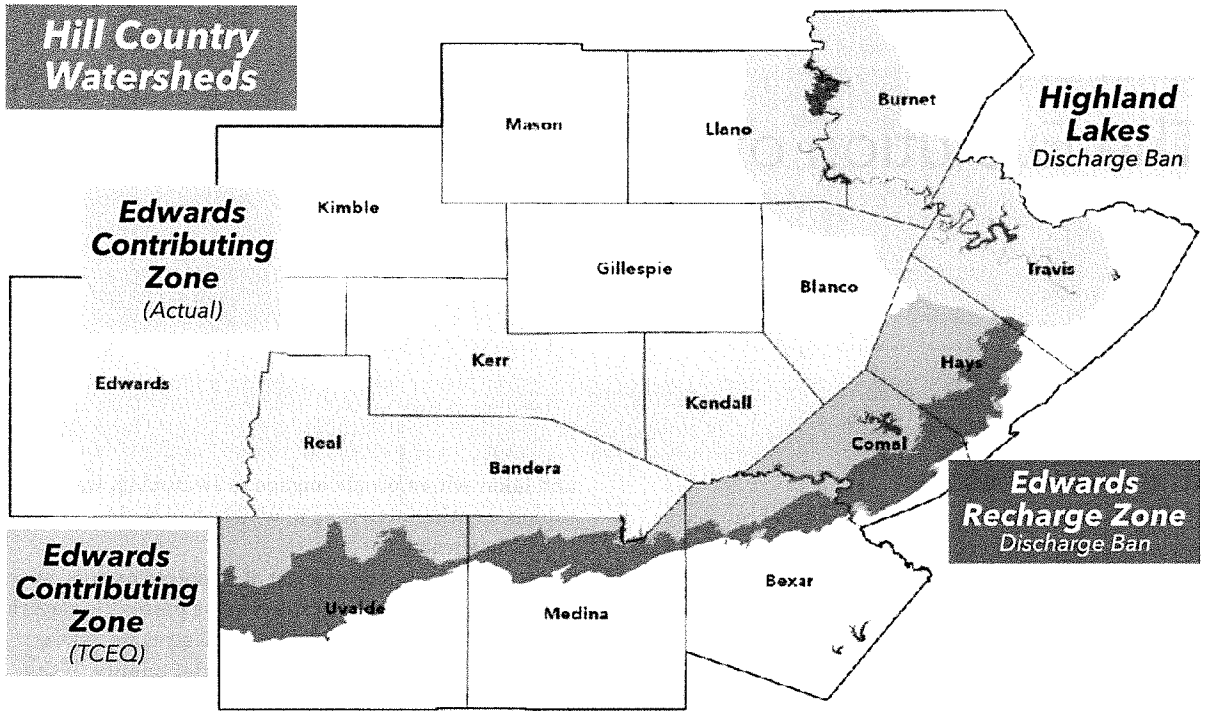
The EPA delegates the administration of the NPDES program to state environmental agencies, including the Texas Environmental Quality Commission (TCEQ). The regulation of water in our state begins with the Texas Surface Water Quality Standards, which TCEQ now updates every three years. The agency first classifies some natural water bodies based on how they're used, how well they support aquatic life, and how often they have natural flow. The classification with the strictest requirements are public drinking water supply, aquifer protection, exceptional aquatic life use, and primary contact recreation, a label that is applied to streams and lakes where people engage in swimming, wading, tubing, or other activities in which they could potentially swallow water.

After limits for the amount of dissolved oxygen, suspended solids, and E. coli that can be present in natural water bodies are set by TCEQ, these streams, lakes, and bays are regularly tested for water quality. If the amount of a pollutant in a natural water body is over the allowed limit, TCEQ will designate that water body as impaired. The agency will then require local governments (and sometimes other entities) to create a plan to reduce pollution to acceptable levels. Pollutant limits for natural water bodies are referred to as Total Maximum Daily Loads (TMDL), and the associated pollution-reduction plans are referred to as Implementation Plans.

TCEQ regulates all cities, industries, and other entities that want to dump wastewater into streams, lakes, and bays, whether a water body is designated as impaired or not. The permitting process ensures that any pollutants added to a natural water body won't cause pollution that exceeds what's allowed for that body.

All existing and proposed sewage plants that want to dump treatment effluent into natural water bodies must apply for a discharge permit through the Texas Pollutant Discharge Elimination System (TPDES). As previously discussed in Chapter 2, permits include pollutant limits that regulate the amount of pollutants that can remain in treated sewage. Pollutant limits are set in relation to water quality limits — the amount of pollutants in sewage shouldn't cause an exceedance in the amount of pollutants in streams or lakes.

Permits for the vast majority of sewage treatment plans in Texas only contain pollutant limits for biochemical oxygen demand (BOD), suspended solids, and E. coli. TCEQ has set limits for nitrogen and phosphorus in a few areas. In addition, TCEQ follows EPA policy in designating sewage plants as major or minor de-



TCEQ banned new wastewater discharge permits in a 10-mile buffer around the Highland Lakes in 1986, and over the Edwards Aquifer Recharge Zone in 1996. The agency also imposed limited restrictions on discharge permits in part of the Edwards Aquifer Contributing Zone.

pending on how much treated sewage they're allowed to dump. Permits for major plants have stricter limits for more pollutants than permits for minor plants, as well as more extensive monitoring requirements.

This regulatory framework only applies to sewage dumped into streams and lakes by treatment plants with a discharge permit. In Texas, on-site sewage facilities are classified as systems that treat less than 5,000 gallons per day of wastewater. OSSFs may be permitted directly by TCEQ, or the agency may delegate its authority to review and approve OSSFs to qualified cities and counties. Land application facilities treating over 5,000 gallons per day are permitted by the Texas Commission on Environmental Quality under the Texas Land Application Permit program, or TLAP.

The reuse of treated wastewater, or reclaimed water, may occur in Texas in connection with either a facility permitted for discharge or a TLAP. Rules for reclaimed water use are found in 30 Texas Administrative Code Chapter 210, and authorization for the use of reclaimed water is approved by TCEQ. Uses for reclaimed water are dependent upon the level of treatment of the wastewater. Type II reclaimed water is treated to a less protective standard but uses for Type II reclaimed water are restricted to those where human contact is unlikely, such as for dust suppression and cooling tower makeup water. Type I reclaimed water is treated to a more protective standard and may be used for outdoor irrigation in public areas as well as indoors for fire suppression systems or toilet flushing.

The beneficial use of effluent in association with either a discharge or TLAP permit allows permittees to use or sell their treated effluent as reclaimed water at another location. Instead of discharging or irrigating the effluent at the plant site, the reclaimed water can be otherwise used or irrigated elsewhere, such as parks or landscaped areas, that would otherwise use treated drinking water.

In response to a rule petition from the City of Austin, TCEQ has also established a beneficial reuse credit program for TLAP wastewater facilities. TLAP facilities that utilize a reclaimed water program may be able to reduce the area required for their dedicated irrigation fields based on the amount of reclaimed water that is reliably used elsewhere. This credit program reduces the cost of expanding TLAP facilities by reducing the amount of additional irrigation land needed to be acquired, and encourages water conservation by promoting the expansion of wastewater reuse.

Hill Country streams, as previously explained, are

very different from streams in the rest of Texas. Pollutant limits for discharge permits are generally based on the assumption that the pollutants in treated sewage will be diluted by the high volume of water in a stream, and that pollutants will additionally be filtered out of the stream because they will be absorbed by the soil or by vegetation. Hill Country streams usually have rocky channels with little vegetation, naturally low concentrations of nutrients and algae, exceptionally clear water that allows sunlight to penetrate throughout the stream creating ideal conditions for the growth of algae, and frequently have little or no water volume during dry months. Yet for the most part, TCEQ has continued to impose statewide pollutant limits on this very different region.

The major exceptions are bans on discharge permits in two areas that are vital sources for drinking water. Austin gets all of its drinking water from the Highland Lakes on the Colorado River, and San Antonio gets most of its water from the Edwards Aquifer. As a result, no sewage discharge permits are allowed within 10 miles of the six Highland Lakes, or on the Edwards Aquifer Recharge Zone, which is where the aquifer is exposed at the surface of the earth and surface water seeps into the underground reservoir. TCEQ has also established some limited restrictions on discharge permits that are located within 10 miles upslope from the Recharge Zone, but these restrictions are inadequate to protect the streams that replenish the Edwards Aquifer.

CHAPTER 5

Nutrients & Algae Pollution

5.1 Algae's Harmful Impact

It took many years to establish that organic matter and fecal bacteria were pollutants in sewage that could be measured through tests and removed through treatment. Similarly, the effort to classify excess nutrients as pollutants that should be removed from sewage has gone on for many years, even though the basic science about their effect on streams has long been well-known. TCEQ still has not developed quantitative standards for nutrients in freshwater streams that are protective of existing uses.

As we saw earlier, the introduction of nitrogen and phosphorus — collectively referred to as nutrients, since they nurture the growth of plants — to streams is a byproduct of current sewage treatment technology. When organic matter such as poop and food waste is decomposed by aquatic bacteria, it's broken down into compounds of carbon, nitrogen, and phosphorus. While some of the carbon dioxide produced by decomposition escapes into the atmosphere, the nitrogen and phosphorus compounds remain in the wastewater that's dumped into streams and lakes. Sewage also picks up extra phosphorus from urine and poop, which contain high levels of the substance.

Recurring summertime blooms of toxic blue-green algae led Austin to place permanent warning signs around Lady Bird Lake , including this one on Barton Creek.

Small amounts of algae are always present in natural water, but usually so little that they're not visible to the human eye. However, when sewage containing high levels of nitrogen and phosphorus is dumped into streams and lakes, it can fertilize the growth of algae. If the circumstances are right, algae can explode into huge blooms that blanket a water body. While the EPA refers to this as nutrient pollution, to most people it looks like algae pollution.

While there are thousands of species of algae, one that commonly grows into masses attached to the rocky bottoms of central Texas streams with elevated levels of nutrients is called Cladophora glomerata. Large Cladophora growths, which look like thick mats of green yarn or cotton, can make it impossible for people to use a stream or lake for swimming, fishing, or other recreation. In worst-case scenarios, algae blooms can also include a variety called blue-green algae, which can produce toxins that are harmful to humans and pets that accidentally swallow water in which it's present. Also known as cyanobacteria, this form of algae generally looks like a thin paint-like scum on the surface of the water. While both forms of algae grow in many places, Cladophora tends to be more common in streams with at least some flowing water, while cyanobacteria tends to be more common in lakes with still water.

As previously explained, algae pollution can have a devastating effect on aquatic life. Algae itself is organic matter, and when it dies, it's decomposed by the oxygen-consuming bacteria that also live in natural waters. If these bacteria have more to eat, they'll reproduce more, and in the process they'll consume even more of the dissolved oxygen in a stream or lake. That leaves less for all of the aquatic animals that also de-

Dead algae in the Reflecting Pool at Vic Mathias Shores in Austin.

pend on the same supply of oxygen, from worms and insects to fish and amphibians. In extreme cases, the cycle of algae growth and bacterial decomposition can use up so much oxygen that the water becomes a dead zone, unable to support any other life.

Sewage with high levels of nitrogen and phosphorus doesn't always cause algae pollution in streams with enough natural water volume to dilute the additional nutrients. Excess nutrients are also less likely to cause problems in streams with lower water clarity and heavily vegetated soil banks, because the dirt and plants will absorb some of the nitrogen and phosphorus. None of these features — consistently high volume, soil banks, low clarity, or heavy vegetation — are characteristic of most Hill Country streams. Instead, the region's creeks and rivers usually have clear water flowing through rocky channels of exposed limestone, with little plant growth on the banks. These streams also have less water volume, since they originate in the western part of the Hill Country, where average annual precipitation is significantly lower. In fact, water volume in some of the region's streams can drop to little or nothing during the dry months of summer and fall.

These factors make Hill Country streams especially vulnerable to nutrient pollution. A 2006 study by the U.S. Geologic Service examined nutrient and biological conditions in 15 small streams in the Hill Country. Streams that did not receive treated sewage had lower levels of nutrients and algae, while streams that did receive wastewater had higher levels of each. The USGS study found that nitrogen levels were 5 times greater in streams with wastewater than in streams without it, and phosphorus levels were 183 times higher.

5.2 Nutrient Regulation

Officials at both the EPA and TCEQ have discussed adopting numeric nutrient standards for years, but with little progress. Texas has adopted some nutrient criteria, but they are qualitative (i.e., defined with descriptions instead of numbers), nearly unenforceable, and don't protect water bodies with naturally low levels of algae and nutrients. The EPA first established a Nutrient Task Force in 1993. In 2001, the agency sent a memo to state environmental regulators in which it outlined its expectations for when states should add nutrient criteria into their water quality standards.

In 2012, the EPA rejected a petition from the Natural Resources Defense Council and 12 other organizations that called on the agency to adopt national numeric nutrient limits for sewage treatment. The EPA said that existing sewage plants faced financial and technical obstacles to installing more advanced technology. Instead, the agency said that it would work to control nutrient levels in treated sewage "by means of

site-specific, water quality–based permitting." Still, the EPA wrote in a 2016 memo that it "continues to advocate the benefits of adopting numeric nutrient criteria because they provide measurable water quality–based goals that are easier to implement than the narrative criteria measurements in many state water quality standards."

The EPA keeps track of major sewage treatment plants with numeric limits for nitrogen and/or phosphorus. (Major plants are defined as having a maximum permitted discharge volume of 1 million gallons per day or more.) Nationwide, 34 percent of all major plants have limits on how much nutrients can remain in treated sewage, but only 7 percent of major plants in Texas have such limits. The EPA also tracks plants that are required to monitor the level of nutrients in treated sewage. Nationwide, 63 percent of major plants have monitoring requirements, but only 4 percent of major plants in Texas do.

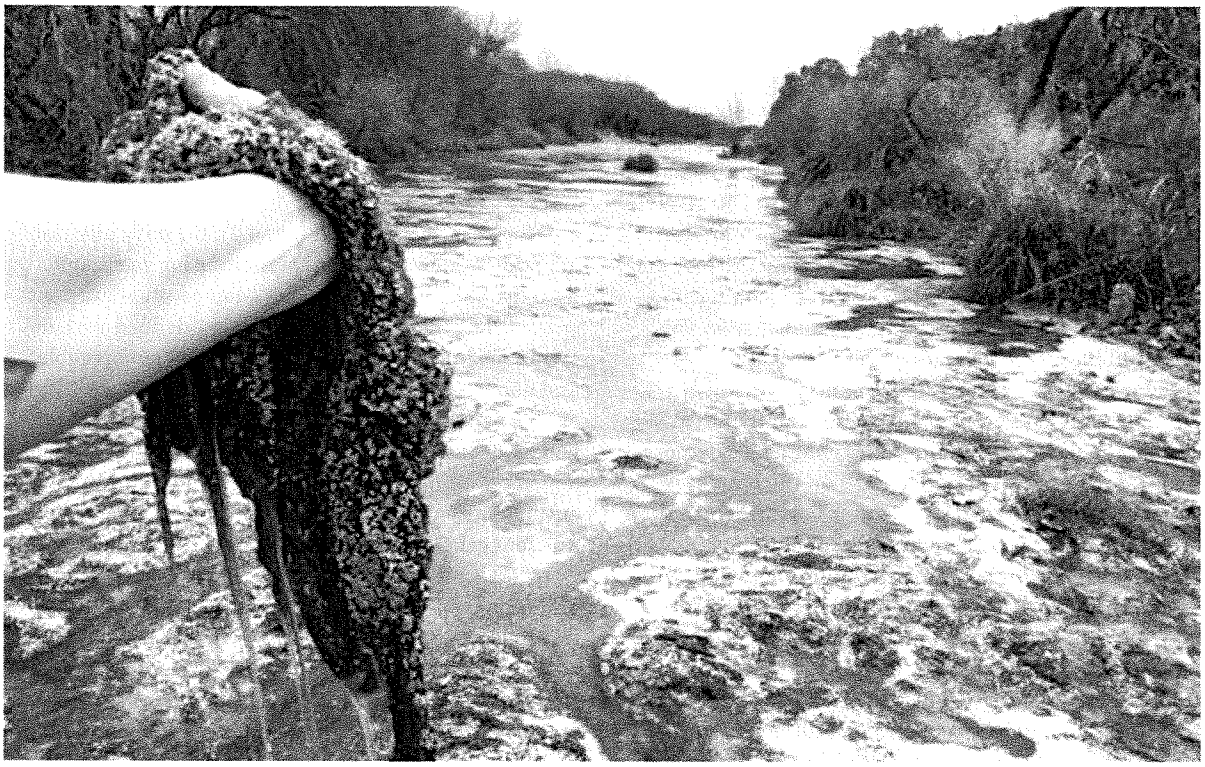
TCEQ created a plan to develop numeric nutrient criteria in 2001, which the EPA accepted six years later. TCEQ created a working group to develop nutrient criteria in 2002, which continues to meet annually. In 2010 the agency adopted a numeric nutrient standard — in the form of a quantitative measure using chlorophyll as a surrogate for the amount of algae present — for 75 reservoirs in Texas. The working group is currently developing nutrient criteria for estuaries. It plans to take up standards for streams and rivers only after that.

5.3 Case Study: Liberty Hill

Recent algae growths in Hill Country rivers and lakes have provided concrete evidence of the impact that nutrient pollution can have on the region's natural waters. In the summer of 2018, huge masses of algae choked the South Fork of the San Gabriel River upstream from Georgetown. After complaints from local landowners, TCEQ investigated the algae outbreak and found that it was caused by sewage from Liberty Hill's municipal treatment plant, located further upstream on the river.

While Liberty Hill is located in Williamson County, just north of the 17-county region covered in this report, the city's record is worth examining in detail because its sewage plant offers a worst-case scenario of how nutrient-saturated wastewater can cause chronic algae blooms. In addition, the South Fork of the San Gabriel River has many of the same characteristics of a Hill Country stream — rocky banks, clear water, less vegetation, and intermittent water flow.

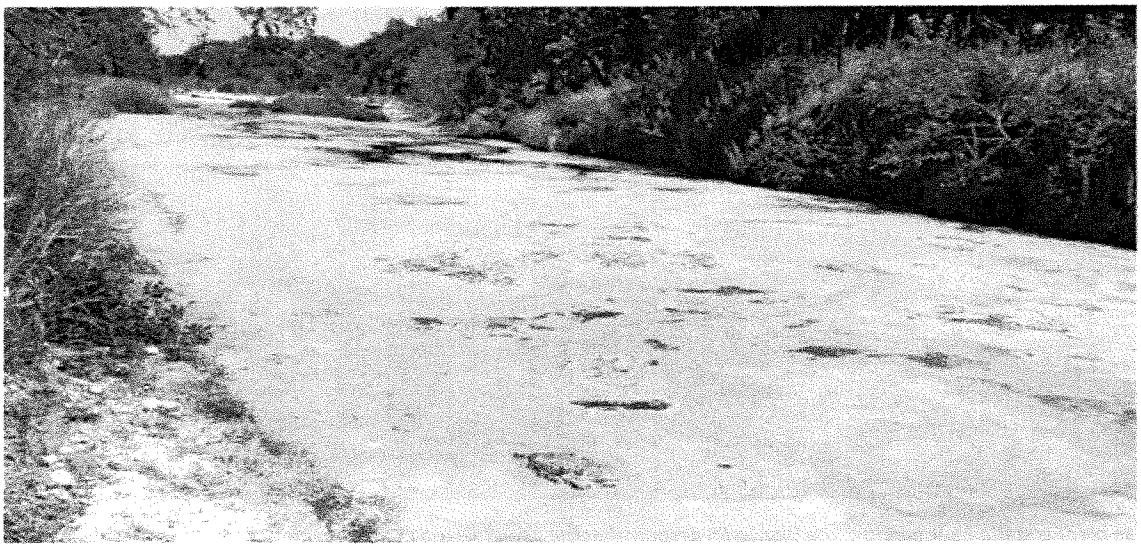
According to TCEQ's 2018 report, algae covered up



Algae in the South Branch of the San Gabriel River downstream from Liberty Hill's sewage plant. (Photo: Stephanie Morris)

Austin American-Statesman

Nonprofit plans suit over Liberty Hill wastewater plant



By Claire Osborn
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Posted Sep 11, 2020

Texas RioGrande Legal Aid has given the Liberty Hill mayor a 60-day notice of intent to file a federal lawsuit against the city claiming its wastewater treatment plant has violated the levels of nutrients it can release into the South San Gabriel River 3,108 times since 2015.

to 95 percent of the river's bottom, from 60 feet upstream of the Liberty Hill plant to three-and-a-half miles downstream. TCEQ determined that the specific cause was sludge that the Liberty Hill plant had illicitly dumped into the river. At one spot, investigators found 18 inches of sludge at the bottom of the river. As discussed earlier, sludge is the residue that settles at the bottom of collection ponds or chambers during primary treatment. Sludge is never supposed to be released with treated wastewater, but TCEQ found that Liberty Hill had done exactly that.

Liberty Hill's sludge disaster was all the more notable given that it had opened a new treatment plant at the beginning of the year. Shortly after that facility came online, the plant's superintendent told a local newspaper, "The new plant is so far ahead of what we had, that the quality of the effluent leaving the plant is light years from what we had."

Liberty Hill challenged TCEQ's findings, which its engineering firm called "a fabricated story." The city's public works director told a local newspaper that the algae growth could have had other causes, "such as, it's spring and at this point we've had low amounts of rain, plus a lot of people have fertilizer in their yards and developments in progress, any of which might potentially affect water quality." But TCEQ stood by its findings.

The city's discharge permit was first approved in 2004, and the city's sewage plant has been problem-plagued almost from the beginning. According to EPA's ECHO database (which has enforcement statistics going back to 2007), the plant has reported effluent exceedances almost every year for the past decade. Measured by days with effluent exceedances, the city's plant has released excessive pollutants into the South Fork of the San Gabriel River 32 percent of the time since 2007.

Residents downstream from the Liberty Hill plant continue to complain about excessive algae growths in the river. In August 2020, Texas RioGrande Legal Aid served the city with notice that it intended to file a federal lawsuit over the pollution on behalf of Stephanie Morris, a local resident. TRLA also asked TCEQ to have an administrative law judge review Liberty Hill's permit. The judge would also consider whether the terms of the existing permit are stringent enough. According to TRLA attorney Loraine Hoane, "Liberty Hill's compliance history is abysmal, with

Algae blooms started appearing in the Blanco River soon after the city's sewage plant began discharging treated wastewater.

hundreds of significant permit violations. The TCEQ is obligated to protect the property rights of downstream landowners, as well as the water quality of the South Fork of the San Gabriel."

5.4 Case Study: Blanco

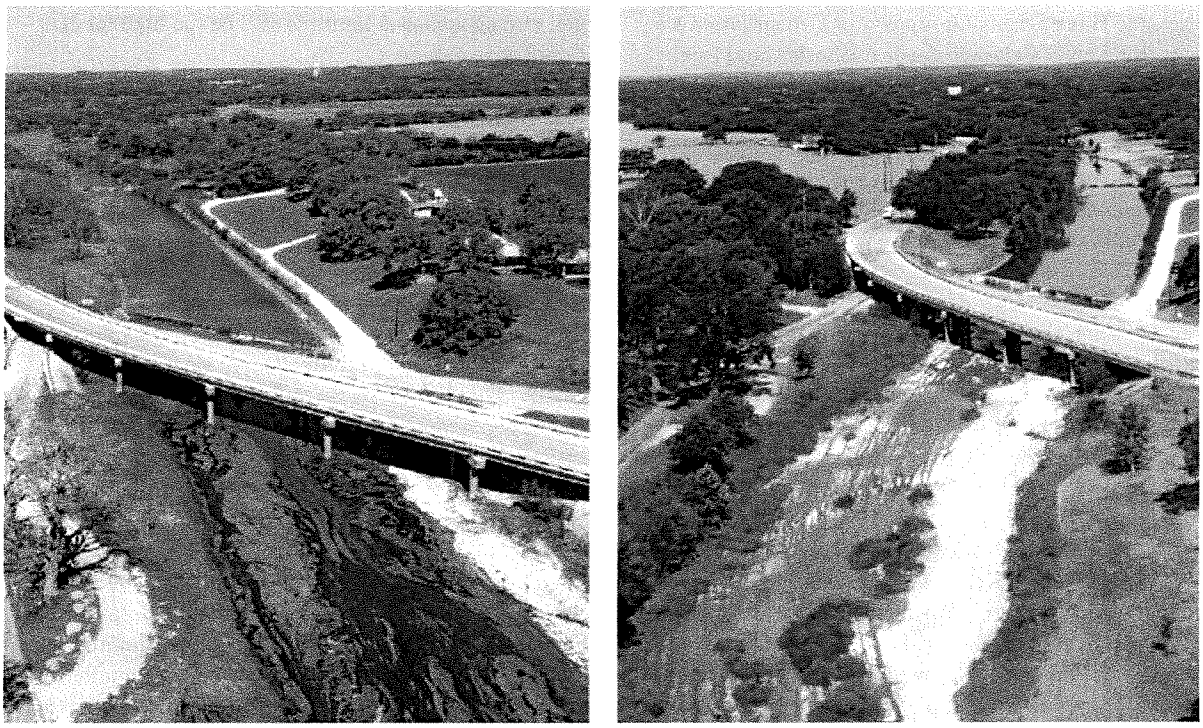
Blanco, in the heart of the Hill Country, has provided another clear example of the harm that wastewater rich in nutrients can cause in a river that can't assimilate them. The city, located on the Blanco River, originally only had a wastewater land application permit. Sewage from Blanco's treatment plant was irrigated onto an adjoining field that the city leased from the property's owner. Because that lease was scheduled to expire, Blanco planned to redirect its wastewater onto a field that it had purchased, but the tract was unable to receive all of the city's wastewater.

Blanco had separately applied to TCEQ for a discharge permit, which the agency approved. The city began discharging treated sewage into the Blanco River in late 2018, and the effect was almost immediate. Large masses of algae blanketed the river below the discharge point, and remained in the stream for all of 2019. Blanco was able to renegotiate its lease for its original irrigation field, however, and was able to stop discharging sewage into the river at the end of 2019. Since then, the algae growths have dissipated and the Blanco River has returned to its normal appearance. In the words of David Baker, executive director of the Wimberley Valley Water Association, "The river is healing."

The increase in nutrient levels below the discharge point was documented by two independent researchers, Ryan King and Sandra Arismendez. King, a professor at Baylor University and director of its Center for Reservoir and Aquatic Systems Research, was commissioned by the Save Our Springs Alliance to study the effect of wastewater on aquatic biology at four Hill Country streams: the Blanco River; Barton Creek and Onion Creek, south of Austin; and Honey Creek, north of San Antonio. He conducted extensive water quality testing at two locations on each stream in June, August, and September 2019.

For Barton, Onion, and Honey creeks, King selected locations that could potentially be affected by wastewater discharge if proposed sewage treatment plants are built on those streams. King's measurements will serve as a useful benchmark if these plants are actually built, but his data also add to the picture of what Hill Country streams look like when they're relatively untouched by human development. In general, he found that these three streams had low levels of nitrogen and phosphorus, low levels of Cladophora algae, and a high variety of macroinvertebrate life.

For the Blanco River, King conducted water quality tests at one location upstream from the city's wastewater plant and at one location downstream. The differences between the two locations — likewise tested in



These aerial views show algae growths in the Blanco River in 2019, when the city was still discharging treated sewage, and earlier this year, soon after the city stopped discharging.

June, August, and September 2019 — were sharp. Phosphorus levels at the downstream location were much higher at all times. An isotope test indicated that nitrogen at the downstream site was coming from biogenic sources like wastewater. A test to gauge the volume of Cladophora found that the amount of this algae at the downstream location in June was almost 10 times greater than the upstream location.

The two testing locations on the Blanco River also displayed significant differences in aquatic life. The wide variety of macroinvertebrate life on display at the upstream site (and at the other three streams in King's study) was replaced at the downstream site by a mix dominated by four species commonly associated with sewage discharge. All of these changes in the river's biology also had an effect on the fish population, King found. Bigger game fish, including largemouth bass, were predominant at the upstream site, while small baitfish and juvenile sunfish were predominant at the location below the sewage plant.

Arismendez's study started in September 2019, picking up where King's study left off. Arismendez is the Water Quality Monitoring Coordinator at The Meadows Center for Water and the Environment at Texas State University. She conducted monthly water quality tests through June 2020 at two locations on the Blanco River – again one located upstream from the city's sewage plant, and another located downstream.

Arismendez found that nitrogen and phosphorus levels were significantly higher at the downstream location than at the upstream location last fall, when Blanco was still discharging treated sewage into the river. However, the levels of both nutrients at the downstream location have dropped steadily since the city stopped discharging sewage into the river.

5.5 Case Study: Belterra

Reducing nitrogen and phosphorus in treated sewage is possible. In fact, it's already being at one Hill Country sewage plant. The Belterra subdivision, located southeast of Austin, was initially developed with a TCEQ land application permit granted to Hays County Water Control and Improvement District (WCID) Number 1. The permit allowed the district to irrigate up to 150,000 gallons of treated wastewater per day onto a dedicated irrigation field.

In 2008, Belterra applied to TCEQ for a discharge permit that would allow it to dump sewage into Bear Creek, a tributary of Onion Creek and a creek that contributes recharge to the Edwards Aquifer. Despite opposition from the city of Austin, Hays County, the Barton Springs Edwards Aquifer Conservation Dis-

trict, the Hays Trinity Groundwater Conservation District, the Lower Colorado River Authority, and local environmental groups, TCEQ granted the permit. Before a hearing by a state administrative law judge, Belterra and most of the permit's opponents reached a settlement agreement. After the hearing, the judge recommended that TCEQ incorporate the settlement terms into a modified discharge permit. Belterra agreed to continue using irrigation as the primary means for wastewater disposal, and to only discharge sewage when the irrigation field was saturated, the holding tanks were full, and/or when Bear Creek was flowing with enough water to dilute the sewage. Because Belterra has a progressive wastewater reuse program within the subdivision for irrigating the effluent, the Belterra treatment plant has not discharged to Bear Creek to date.

The settlement also required Belterra to comply with pollutant limits that were described by TCEQ as the most stringent in Texas at the time. The final permit set limits of 5 milligrams per liter for CBOD (carbonaceous biochemical oxygen demand), 5 mg/L for total suspended solids, 2 mg/L for ammonia, 6 mg/L for total nitrogen, and 0.15 mg/L for total phosphorus. The settlement additionally required Belterra to use membrane bioreactor (MBR) technology for nutrient removal, and to use ultraviolet light treatment for the final stage of disinfection. While the Belterra nutrient limits were an improvement over permits with no nutrient limits at all, several experts consider the nitrogen and phosphorus limits to still be too high for Hill Country streams.

The impacts of both the regulated pollution from facilities operating in compliance with their permit from TCEQ, and unregulated pollution in the form of wastewater treatment plant failures as noted in Chapter 2, may be having demonstrable impacts on the quality of Hill Country water resources. Barton Springs is the primary discharge point of the Barton Springs Segment of the Edwards Aquifer, habitat for two species of federally endangered aquatic salamanders, and where more than 800,000 visitors swim annually. The City of Austin and US Geological Survey have been monitoring Barton Springs for decades, and observe that nitrogen levels in Barton Springs continue to increase over time. Isotopic analysis of the nitrogen indicates that it is of a "biogenic" source, meaning it is derived not from fertilizer or rainfall but from human or animal waste. Livestock operations have decreased over time as urbanization expands in the area feeding Barton Springs, and is not likely contributing to the increasing nitrogen. Review of other water quality contaminant changes in Barton Springs over time further suggests that the pollution is not from non-point source pollution, or runoff from urban areas or roads, but from wastewater disposal which has increased substantially in the area contributing recharge to Barton Springs. This trend illustrates not only the inadequacy of current wastewater treatment methods, but also the sensitivity of these karst systems to contamination.

CHAPTER 6

Recommendations

One of the themes of this report is evolution. Our knowledge of the pollutants in sewage and their effects on the environment has gradually evolved over time. As a result, the way that we treat sewage, and the way that we regulate it, has also evolved.

When Austin's population started to grow at a faster pace in the 1970s, the amount of wastewater that it produced grew so fast that its treatment plants couldn't keep up. One plant was so overwhelmed that raw sewage had to be trucked to other plants for treatment. The city periodically discharged partially treated or raw sewage, causing algae blooms downstream on the Colorado River. Austin's plants had more than 600 permit violations in 1982 and 1983. But the city responded by convincing residents to approve bonds to expand Austin's wastewater system. And the Lower Colorado River Authority, which the Legislature had authorized to monitor the river's water quality, convinced the city to treat its sewage to lower pollutant limits than required by the state.

The state took action, too. A commission appointed by the governor in 1985 to study ways to protect the Colorado River's water quality recommended a ban on new sewage discharge permits around the Highland Lakes. The following year, the prohibition was enacted. In 1996, the state implemented a ban on new discharge permits in the Edwards Aquifer Recharge Zone. Since then, there's been no further evolution of sewage regulations in the Hill Country, even though more advanced options for treating and managing wastewater exist now than ever before.

As this report has shown, a majority of existing municipal sewage plants in the Hill Country are unable to even comply with the lax pollutant limits in their permits. The following steps are essential for preserving and improving water quality in a region beloved by all Texans.

1 Ban new wastewater discharge facilities in the Texas Hill Country

A ban is the most effective tool to prevent sewage pollution and is appropriate for the most sensitive waterways in our state. TCEQ has the authority to establish a ban.

- TCEQ should ban new discharge facilities in the Edwards Aquifer Contributing Zone and other parts of the Hill Country.

2 Establish nutrient limits for water quality standards and wastewater permits

Wastewater standards are set in relation to water quality standards. Both sets of standards should contain strict limits on total nitrogen and total phosphorus for Hill Country streams.

- TCEQ should update the state's water quality standards to include strict nutrient limits for Hill Country streams based on naturally occurring levels of total nitrogen and total phosphorus.
- TCEQ should include strict nutrient limits in new wastewater discharge permits, especially when cumulative discharges have the potential to significantly harm naturally occurring nutrient levels in receiving water bodies.
- TCEQ should use nutrient monitoring data to determine whether to add more protective nutrient limits to existing permits when they come up for renewal.

Fund upgrades for nutrient removal technology at existing sewage plants

The federal Clean Water Act established the funding to pay for sewage plant upgrades. This funding mechanism continues today as the Clean Water State Revolving Fund, with an 80 percent contribution from the federal government and a 20 percent from each state's government.

- The Texas Legislature should increase funding for the enhancement and improvement of nutrient removal technology at existing sewage plants.

Require and promote the beneficial reuse of wastewater

The better option for treated wastewater is to use it for landscape irrigation or reuse it in buildings.

- Cities and counties should adopt development policies to require and promote the use of decentralized on-site sewage treatment facilities, including in public buildings, as well as wastewater reuse systems for outside irrigation and interior low-priority needs.
- Cities and counties should explore a tax credit to incentivize wastewater reuse and direct potable reuse.

Improve the enforcement of permit limits at existing sewage plants

Stricter permit enforcement is necessary for existing wastewater plants, which are already responsible for significant amounts of sewage pollution and environmental degradation.

- TCEQ should set specific rules for effluent exceedances (for example, a warning for the first set of exceedances, an enforcement order for the next set, a fine for the next set, etc.).
- TCEQ should inspect plants more regularly. Inspections should not be announced in advance. The agency should periodically collect and test its own samples of wastewater in order to verify plants' self-reported data.
- The Legislature should provide the necessary funding for TCEQ to increase its enforcement work.
- TCEQ should issue larger fines not only to deter future pollution, but to help fund increased enforcement.
- After a new plant begins discharging treated sewage, the permit-holder should fund a short-term water quality testing program to determine whether the effluent is affecting critical receiving areas.

Explore other ways to reduce sewage pollution and improve water quality

- Survey key staff from cities, counties, groundwater conservation districts, river authorities, and water or wastewater utility providers to understand their perspective on wastewater discharge, identify opportunities for education, and characterize knowledge gaps for future studies.
- Increase the funding and resources for water quality testing through TCEQ's Clean Rivers Program.
- Explore the creation of wastewater service and reuse districts that operate across jurisdictional lines.
- Explore the creation of a nonprofit wastewater plant operator that could take over the operation of poorly functioning plants, and establish best practices for plant operation and information-sharing procedures.
- Hill Country governments should adopt the One Water management approach, since natural water, stormwater, and wastewater are different forms of the same resource.

Government officials, professional and academic experts, and nonprofit groups must work together to protect this beautiful region's pristine streams from sewage pollution. We hope that this report serves as a foundation for new regulations, new collaborations, and new conversations to keep the Hill Country a special place for all Texans.

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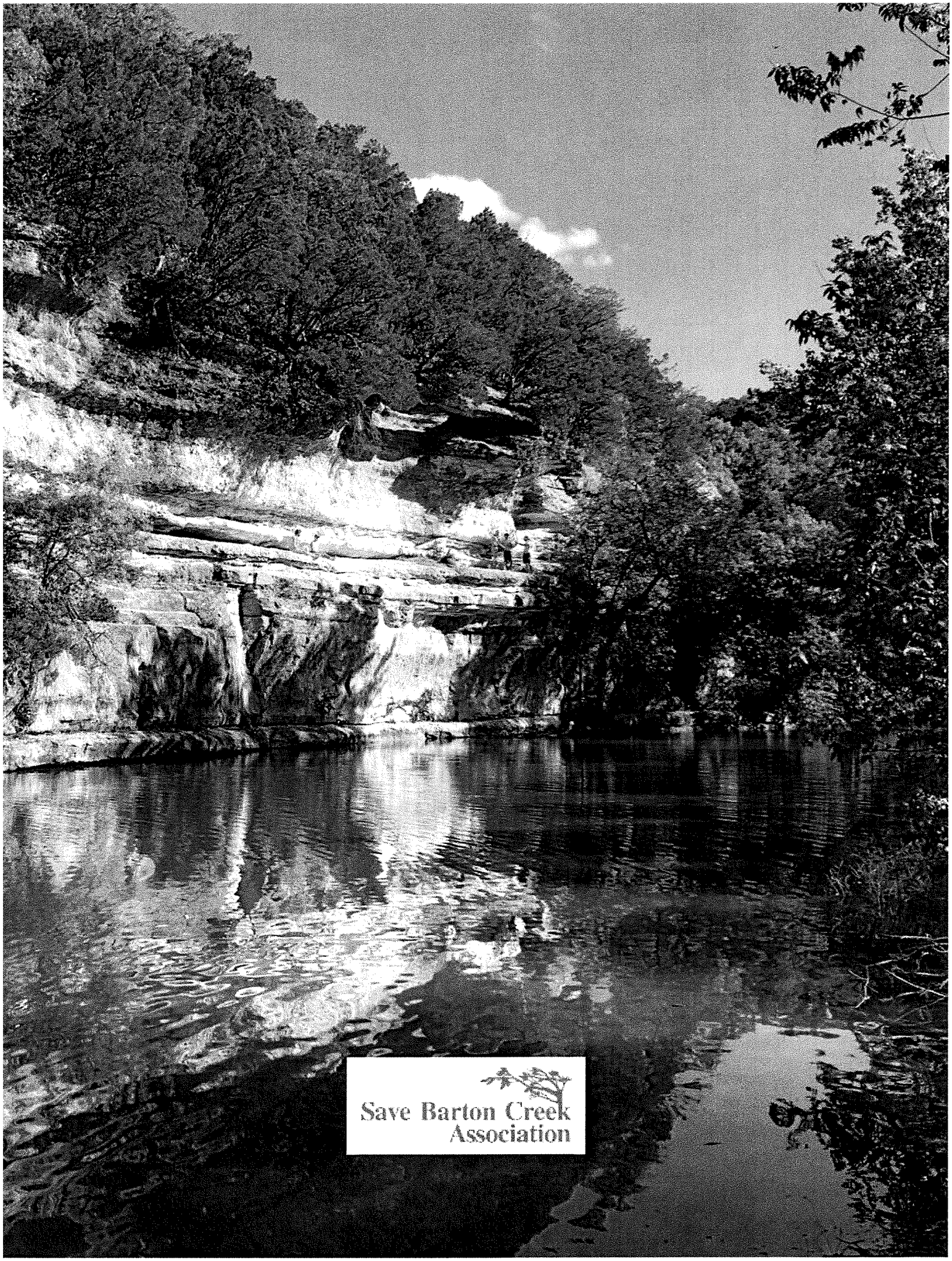

Save Barton Creek
Association

Lori Rowe

From: PUBCOMMENT-OCC
Sent: Tuesday, April 12, 2022 11:37 AM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: WQ0015918001
Attachments: KingRS_BlancoCityCouncil_Public_Comment_Aug_2020.pdf; DrRyanKing_final_report_from_baylor_university_to_sosa_final_10.23.20.pdf

From: CHIEFCLK <chiefclk@tceq.texas.gov>
Sent: Tuesday, April 12, 2022 8:20 AM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: FW: WQ0015918001

From: David Price <david@texasonsite.com>
Sent: Monday, April 11, 2022 8:04 PM
To: CHIEFCLK <chiefclk@tceq.texas.gov>
Cc: Tom Goynes <tomgoynes@mac.com>; Victoria Rose <victoria@sosalliance.org>; David Price, PE <dprice@texasonsite.com>
Subject: WQ0015918001

Texas Rivers Protection Association, TRPA, adds the attached reports to our comments. We were unable to upload to the e-comments section.

We object to any amounts of phosphorous over 20 ppm.

Thanks.

David Price, PE
Texas Rivers Protection Association
444 Pecan Park Drive
San Marcos, TX 78666
512.698.7676

Final Report

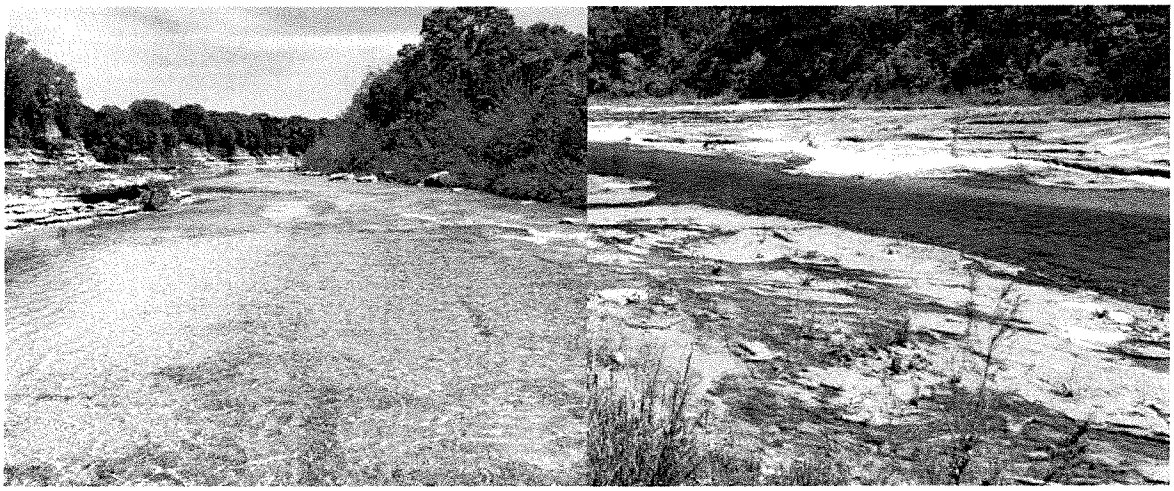
October 2020

Bioassessment of four Hill Country streams threatened by proposed municipal wastewater discharges

Principal Investigators:

Dr. Ryan S. King (PI) and Dr. Jeffrey A. Back (co-PI)

Center for Reservoir and Aquatic Systems Research, Baylor University, Waco, TX



Research sponsored by the Save Our Springs Alliance

With support from the Shield Ranch Foundation, Kirk Mitchell Environmental Law Fund, and Protect Our Blanco

TABLE OF CONTENTS

Scope of Work

The investigators were charged with completing a comprehensive biological assessment of four (4) Hill Country streams that were subject to permit applications for wastewater treatment plant (WWTP) effluent discharges. The four streams included Onion Creek, Blanco River, Honey Creek, and Barton Creek. Sampling occurred during late spring (high base flows) and late summer (low flows). Each stream was sampled above and below proposed locations of WWTP effluent discharges. Locations were selected with the cooperation of SOSA and landowners. Thus, a total of eight (8) stream reaches (defined stretches of streams with defined upstream and downstream locations) were sampled two (2) times each, or the equivalent of sampling 16 stream reaches during the period of performance.

Each reach was sampled in accordance with current Texas Commission on Environmental Quality (TCEQ) biological assessment protocols. Biological assemblages, or community types, sampled were as follows:

1) Periphyton and macroalgae (high and low flow)
2) Benthic macroinvertebrates (high and low flow)
3) Fish (critical flow period, late summer, per TCEQ guidelines)

Further, discharge, surface-water chemistry (temperature, dissolved oxygen, specific conductance, pH, turbidity, dissolved inorganic phosphorus (PO4-P), total phosphorus (TP), ammonium-nitrogen (NH4-N), nitrate-nitrite-N (NOx-N), and total N (TN) were sampled and analyzed at least two times from each reach during the study period. Finally, YSI EXO1 datasondes were deployed at each stream during high and low flow periods to estimate instantaneous changes in dissolved oxygen, pH, conductivity, and temperature at 15-minute intervals over at least a 24 h period.

The following is the final report summarizing results in accordance with the scope of work and services agreement (#32030263)

Study Sites

Four streams were targeted for this study: Barton Creek, Onion Creek, Blanco River, and Honey Creek (Figure 1). Sites were selected in consultation with the sponsor based on current and potential future wastewater discharge permit applications that threatened the water quality and biological integrity of these four, high-quality Hill Country streams.

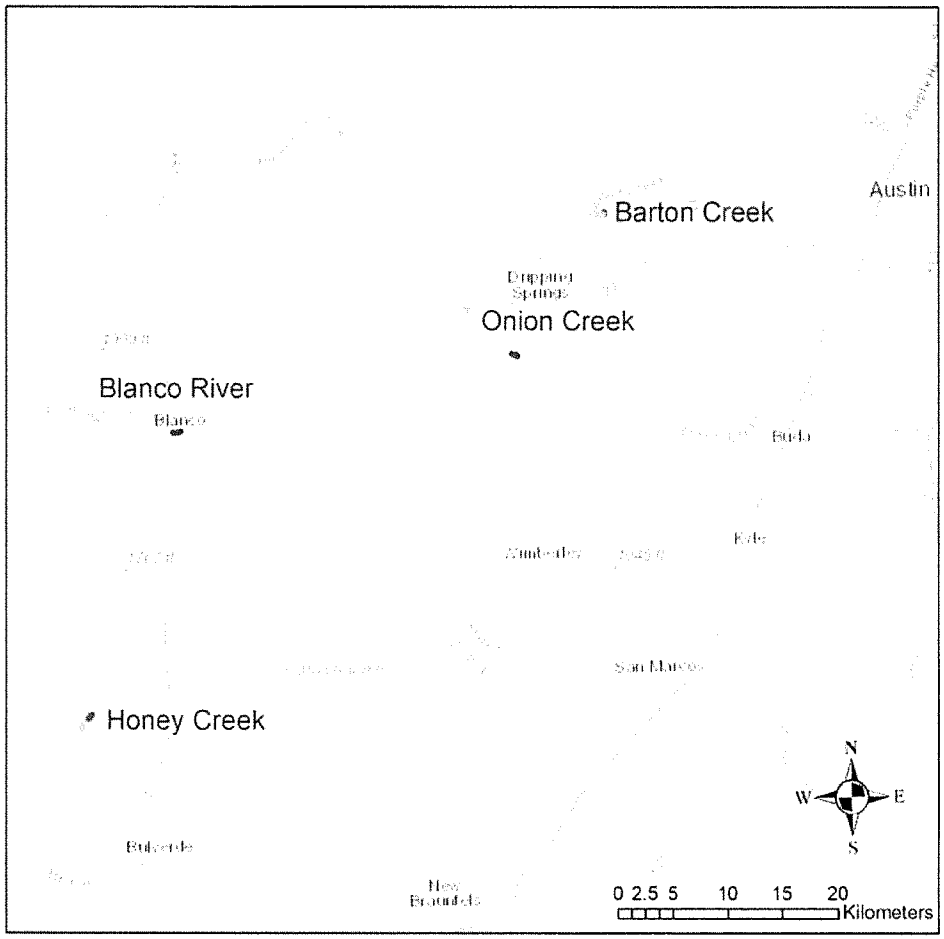


Figure 1. Location of the four streams within the Hill Country region of central Texas. Red and green markers indicate location of the downstream (red) and upstream (green) paired set of reaches per stream.

In March and April 2019, the PIs visited each stream to identify optimal reaches for sampling. The study design, in accordance with the scope of work, was to pair a reach downstream of an existing or pending wastewater discharge with an upstream reach that was as close to the downstream reach as possible while maintaining similar channel form, canopy cover, and other physical characteristics that would necessarily influence the diversity of algae, macroinvertebrates, and fish in each location. In other words, the goal was to have two reaches within each stream that were essentially identical in every way except location relative to an existing or pending wastewater treatment discharge.

Barton Creek

Barton Creek reaches were located on Shield Ranch, Travis County, TX (Figure 2). Reaches were located approximately 16 km upstream (flow distance) from the intersection with SH 71 near Oak Hill, which is the nearest USGS gaging station (USGS 08155200, https://waterdata.usgs.gov/tx/nwis/uv/?site_no=08155200&PARAmeter_cd=00065,00060). Reaches were coded as Barton Creek, Lower (BCL; 30.263458 N, -97.992838 W) and Barton Creek, Upper (BCU; 30.261626 N, -97.994977, W). Each reach was approximately 300 m in length. The upstream marker of BCL was 60 m downstream of the confluence with Long Branch, the tributary that may receive wastewater discharges pending the permit application. The downstream marker of BCU was 130 m upstream of the confluence of Long Branch.

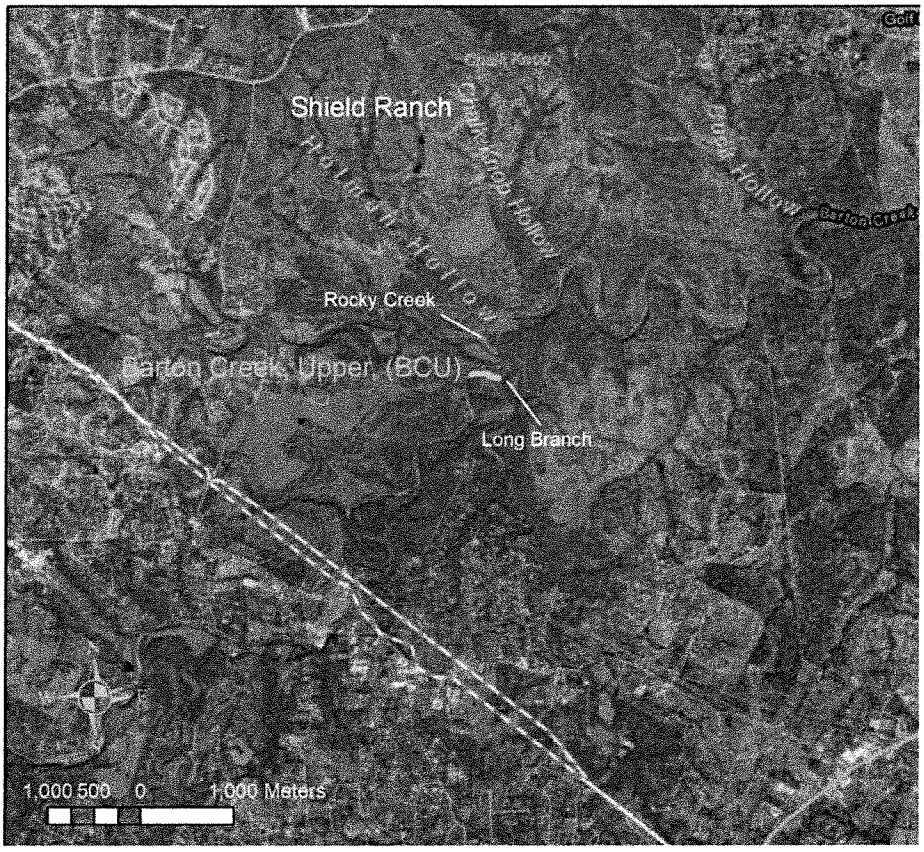


Figure 2. Location of Barton Creek, Lower (BCL) and Barton Creek, Upper (BCU) reaches relative to the proposed wastewater discharge (Long Branch) and a nearby downstream tributary, Rocky Creek, on Shield Ranch, Travis Co., TX.

s

Figure 3a. Barton Creek, Shield Ranch, April 2019

Figure 3b. Barton Creek, Shield Ranch, August 2019. View of substrate.

Onion Creek

Onion Creek reaches were located on CharRo Ranch (lower reach) and above the low-water crossing on Creek and Mt Gainor Roads (upper reach), Hays County, near Dripping Springs, TX (Figure 4). The lower reach was located approximately 18 km (flow distance) upstream from the nearest USGS gaging station (USGS 08158700, https://waterdata.usgs.gov/tx/nwis/uv/?site_no=08158700&PARAmeter_cd=00065,00060). Reaches were coded as Onion Creek, Lower (OCL; 30.147500 N, -98.076889 W) and Onion Creek, Upper (OCU; 30.186735 N, -98.123443 W). OCL was approximately 500 m in length, whereas OCU upper was 300 m long. The lower marker of OCL was 50 m downstream of the confluence with South Onion Creek. The downstream marker of OCU was 20 m upstream of the Creek Rd/Mt Gainor low water crossing (Figure 4).

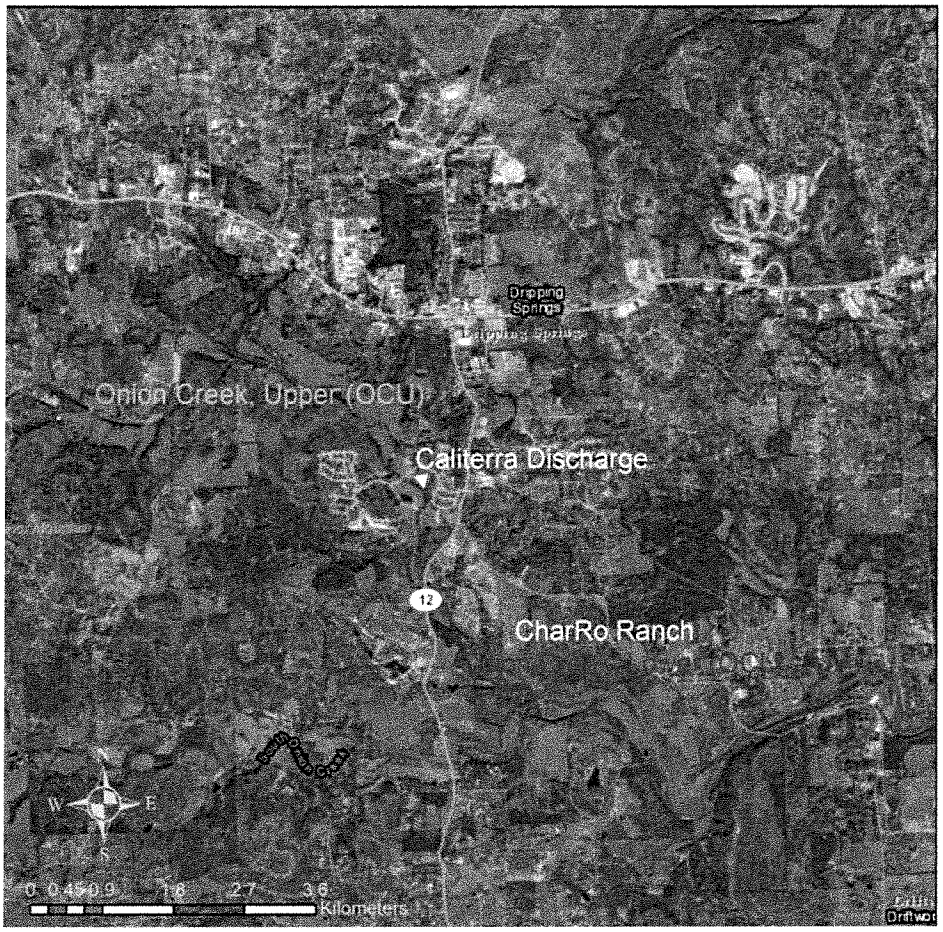


Figure 4. Location of Onion Creek, Lower (OCL) and Onion Creek, Upper (OCU) reaches relative to the proposed wastewater discharge (within Caliterra residential development). OCL was located on CharRo Ranch near the confluence with South Onion Creek whereas OCU was upstream of CharRo Ranch at the nearest upstream location with reasonable access via public easement at junction of Creek and Mt. Gainor Roads, Hays Co., TX.

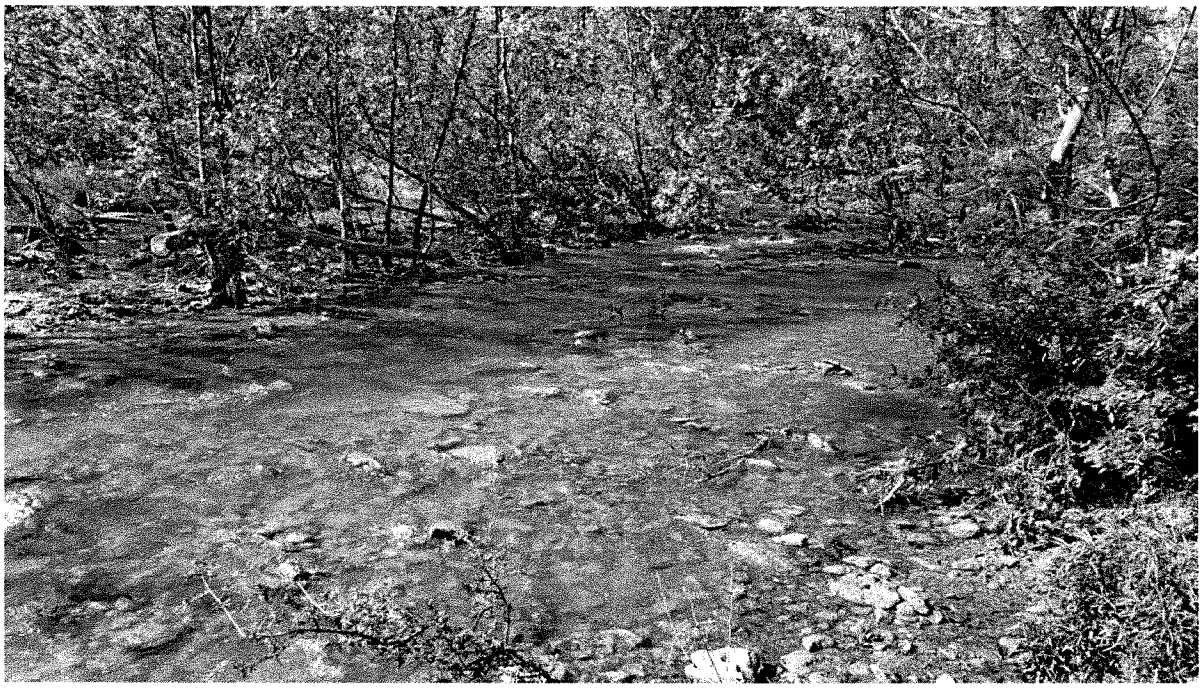


Figure 5a. Onion Creek, CharRo Ranch, April 2019.

Figure 5b. Onion Creek, Upper Reach (above intersection of Mt. Gainor and Creek Roads), April 2019.

Blanco River

Blanco River reaches were located at Blanco Settlement just downstream of the SH 165 crossing (lower reach) and along Goldwin Smith Road, a private, unpaved road that paralleled the river (upper reach), Blanco County, near Blanco, TX (Figure 6). The upper reach was located approximately 3.5 km (flow distance) downstream from the Crabapple Road USGS gaging station (USGS 08170800, https://waterdata.usgs.gov/tx/nwis/uv/?site_no=08170800&PARAmeter_cd=00065,00060). Reaches were coded as Blanco River, Lower (BRL; 30.090137 N, -98.398604 W) and Blanco River, Upper (BRU; 30.104554 N, -98.483264W). BRU and BRL were approximately 400 m in length.

Figure 6. Location of Blanco River, Lower (BRL) and Blanco River, Upper (BRU) reaches. BRL was located immediately adjacent to Blanco Settlement downstream approximately 500 m of the suspected wastewater discharge point from the City of Blanco. BRU was upstream of the City of Blanco immediately adjacent to Goldwin Smith Road, a private, unpaved drive, which was the nearest upstream location with free-flowing habitat that was comparable to BRL, as most of the river between BRU and BRL was impounded. Blanco Co., TX.

Figure 7a. Blanco River, Upper Reach (Goldwin Smith Road), April 2019

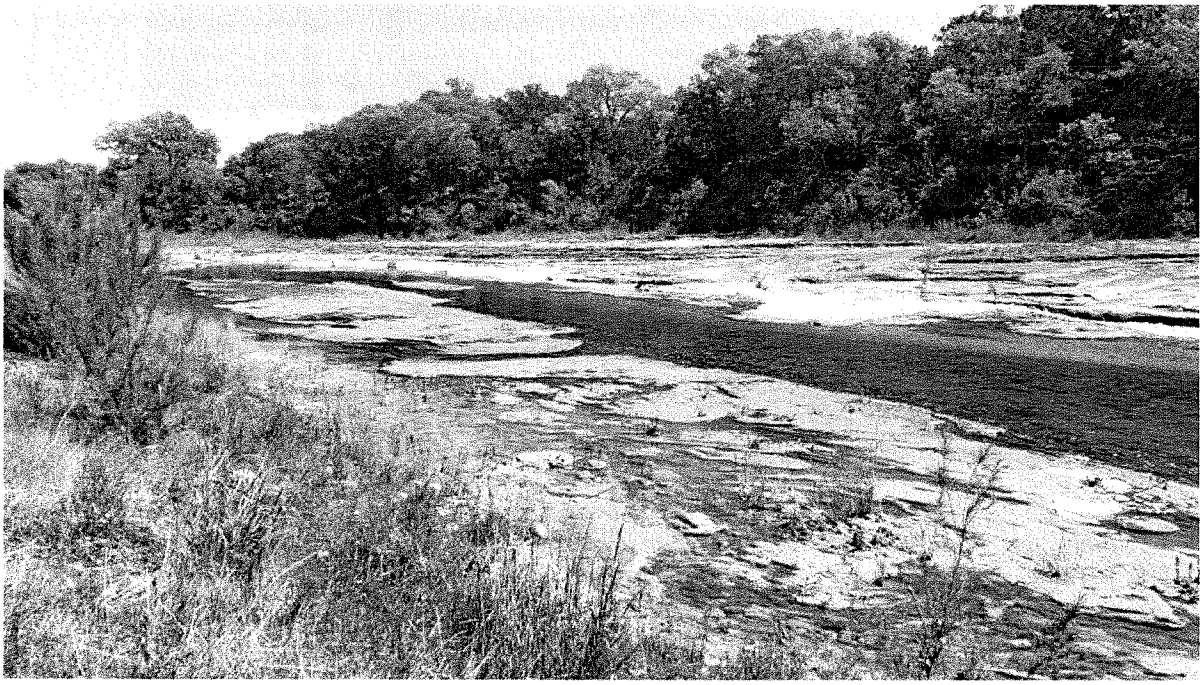


Figure. 7b. Blanco River, Blanco Settlement (Lower Reach), April 2019. Note the heavy filamentous algal growth not evident at the upstream location.

Honey Creek

Honey Creek reaches were located in Honey Creek State Natural Area, Guadalupe State Park, Comal County, TX (Figure 8). Both reaches were located below the location of the anticipated wastewater treatment discharge because areas upstream of the discharge are dry for most of the year. Thus, the location of the reaches in Honey Creek differed from the other pairs of reaches in that there was no upstream/downstream comparison. However, the two reaches on Honey Creek captured two different, major spring discharges which could translocate effluent from the proposed discharge in different ways.

The upper reach was located approximately 0.25 km (flow distance) downstream from the first major spring discharge where Honey Creek maintains perennial flow. The downstream reach was located off of a secondary road connected to State Park Rd P31 and just downstream of Beek Spring, which is a significant source of groundwater compared to the upstream spring. Reaches were coded as Honey Creek, Lower (HCL; 29.860162 N, -98.482810 W) and Honey Creek, Upper (HCU; 29.851997 N, -98.489887 W). HCU and HCL reaches were approximately 250 m in length.

Figure 8. Location of Honey Creek, Lower (HCL) and Honey Creek, Upper (HCU) reaches within Honey Creek State Natural Area and Guadalupe State Park, Comal Co., TX.

Figure 9a. Honey Creek, Upper Reach, May 2019

Figure 9b. Honey Creek, Lower Reach, May 2019

Results

BARTON CREEK

Summary

Barton Creek Upper and Lower Reaches were similar in physical, chemical, and biological characteristics during both high (April-May) and low (August) flow sampling events. Long Branch, the tributary that enters the stream above the lower reach and threatens Barton with potential inputs of nutrients from a pending WWTP permit, had water chemistry that was similar to Barton, with little evidence of nutrient enrichment above background conditions in Barton.

Barton nutrient levels were consistent with a high-quality, reference stream in the Edwards Plateau or Cross Timbers Ecoregions of central Texas, with total and orthophosphate (PO_4-P)-phosphorus values < 10 µg/L, total nitrogen (TN) at or below 300 ug/L, nitrite+nitrate-N values at or below 200 µg/L, and ammonium-N < 10 µg/L. All of these values represent high quality, low nutrient conditions.

Dissolved oxygen levels were high and remained at or above levels that are supportive of natural biological communities in Texas streams. EXO1 sondes, which were deployed to capture 15-minute intervals of dissolved oxygen and other parameters, revealed similar DO levels between the two reaches during the day and night. The High flow deployment captured an extreme high-water event on May 3, 2019, with stream flow levels jumping from ~100 cfs to ~30,000 cfs in a few hours. The sondes, which were chained to trees, were recovered a few weeks later after flows receded to safe levels for wading. The flood event is very evident in the data, but, surprisingly, DO remained high and even showed daily oscillations that demonstrated modest levels of primary production occurring during the daylight hours even under flood conditions.

Sestonic (sestonic refers to particles in the water column) organic matter (ash-free dry mass particulates), chlorophyll-a (phytoplankton), and total suspended solids were consistent with high-quality, reference stream conditions in both reaches and Long Branch during both high and low flow events. Sestonic chlorophyll-a peaked in high flows at ~ 2 µg/L and was < 1 µg/L during low-flow conditions. For reference, >10 µg/L of sestonic chlorophyll-a is often indicative of eutrophic (nutrient over-enriched) conditions in lakes and rivers.

Periphyton (benthic algae, or algae attached to the stream bottom, particularly on large cobble-sized rocks) biomass was also quite low and consistent with a low-nutrient ecosystem. Total biomass (ash-free dry mass, which the total mass of algae after removing inorganic particles such as carbonates, silt, sand, etc.) and chlorophyll-a were higher in the upper reach during high flow, but values were still quite low in both reaches. Maximum benthic chlorophyll-a (again, benthic refers to algae attached to rocks on the stream bottom) was approximately 45 mg/m^2. For reference, values that exceed 150-200 mg/m^2 are often considered indicative of excessive nutrient pollution, although even lower levels of chlorophyll-a can be associated with a nutrient overenrichment problems, depending upon the reference condition.

Periphyton stable isotope values for carbon (δ13C) and nitrogen (δ15N) were similar between reaches and seasons. The stable nitrogen isotope ratio, δ15N, is often elevated when periphyton obtains its nitrogen from municipal wastewater discharges, was similar above and below Long Branch, suggesting

Long Branch is not contributing a significant source of wastewater to Barton Creek at this time. However, should this change, the lower reach should show an increase in δ15N as compared to the upper reach.

Biomass of *Cladophora glomerata*, the most common nuisance filamentous green algal species associated with excessive nutrient enrichment, was extremely low in both reaches. It is normal for streams to have some *Cladophora*, so detecting it here was not unexpected. Total algal biovolume, excluding diatoms, was also quite low and consistent with a low-nutrient reference stream.

Diatom species richness was similar between both reaches (30-35 species, depending upon season). Phosphorus (P) sensitive taxa richness and abundance was similar between reaches, as was the richness of P tolerant taxa. It is normal for P tolerant taxa to be found in low-nutrient streams; what matters more is their relative abundance, and, here, they represented well below 50% of the richness and total counts of diatoms.

Macroinvertebrate community composition was quite similar between reaches. Both reaches had about 30 taxa, regardless of season. Using the TCEQ Multimetric Index, both reaches were deemed "Exceptional" in terms of their Aquatic Life Use Designation based on macroinvertebrate communities. The density of macroinvertebrates was low during the high flow event, which was likely due to the huge scouring of the stream channel during the major flood about 1 month before our sampling. The fact that the stream still supported relatively high numbers of species and rated exceptional after this flood is a testament to the high-quality habitat and water found in this stretch of Barton Creek.

Fish assemblages were consistent with high quality Hill Country streams. Species such as Guadalupe Bass, a species endemic to a small region of the Hill Country, were found in both reaches, as were numerous other native species typical of streams in the region.

Barton Creek: Nutrients

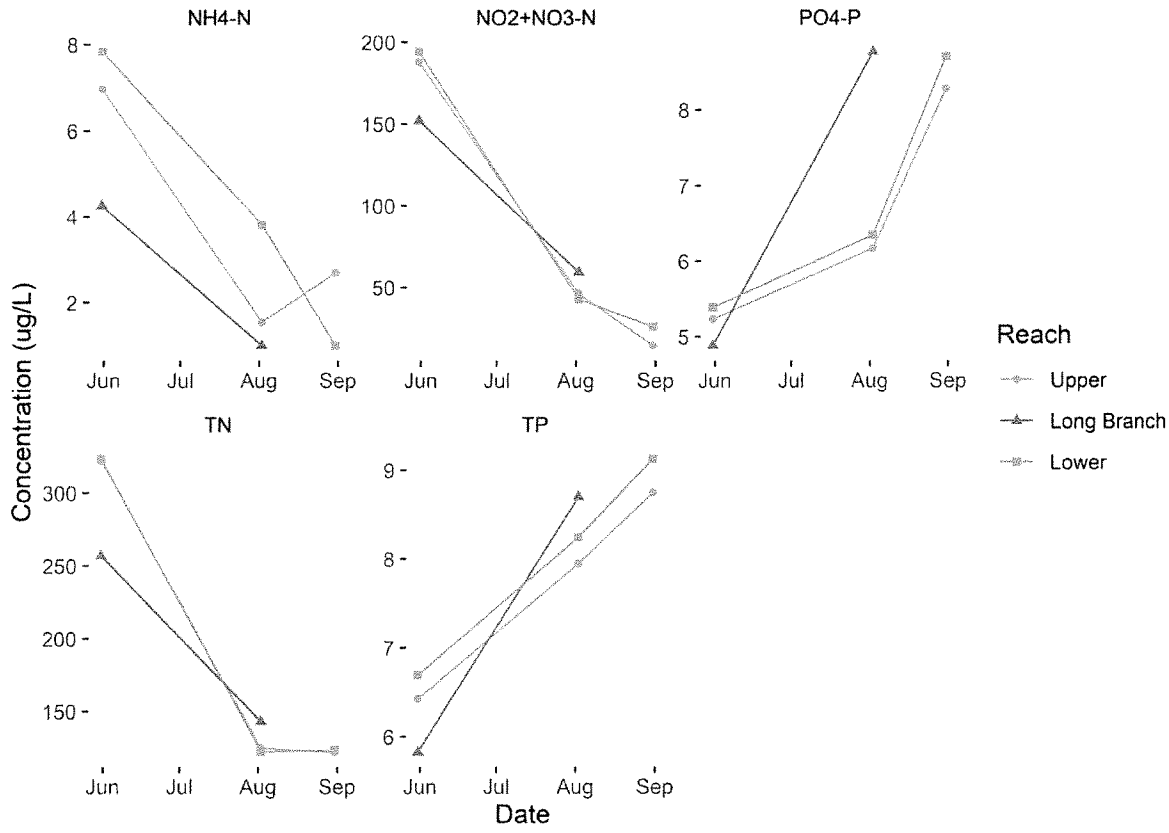


Figure Barton.1: Nutrient levels were consistent with a high-quality, reference stream in the Edwards Plateau or Cross Timbers Ecoregions of central Texas, with total phosphorus (TP) and orthophosphate (PO4-P)-phosphorus values < 10 µg/L, total nitrogen (TN) at or below 300 µg/L, nitrite+nitrate-N (NO2+NO3-N) values at or below 200 µg/L, and ammonium-N (NH4-N) < 10 µg/L. All of these values represent high quality, low nutrient conditions. Note that the decline in nitrogen during late summer with simultaneous small increase in phosphorus may indicate that Barton Creek was shifting toward nitrogen limitation during the warmer, dryer months, or that the source of N, which was likely groundwater, was declining.

Barton Creek: YSI EXO1 Data Sonde Parameters, Instantaneous

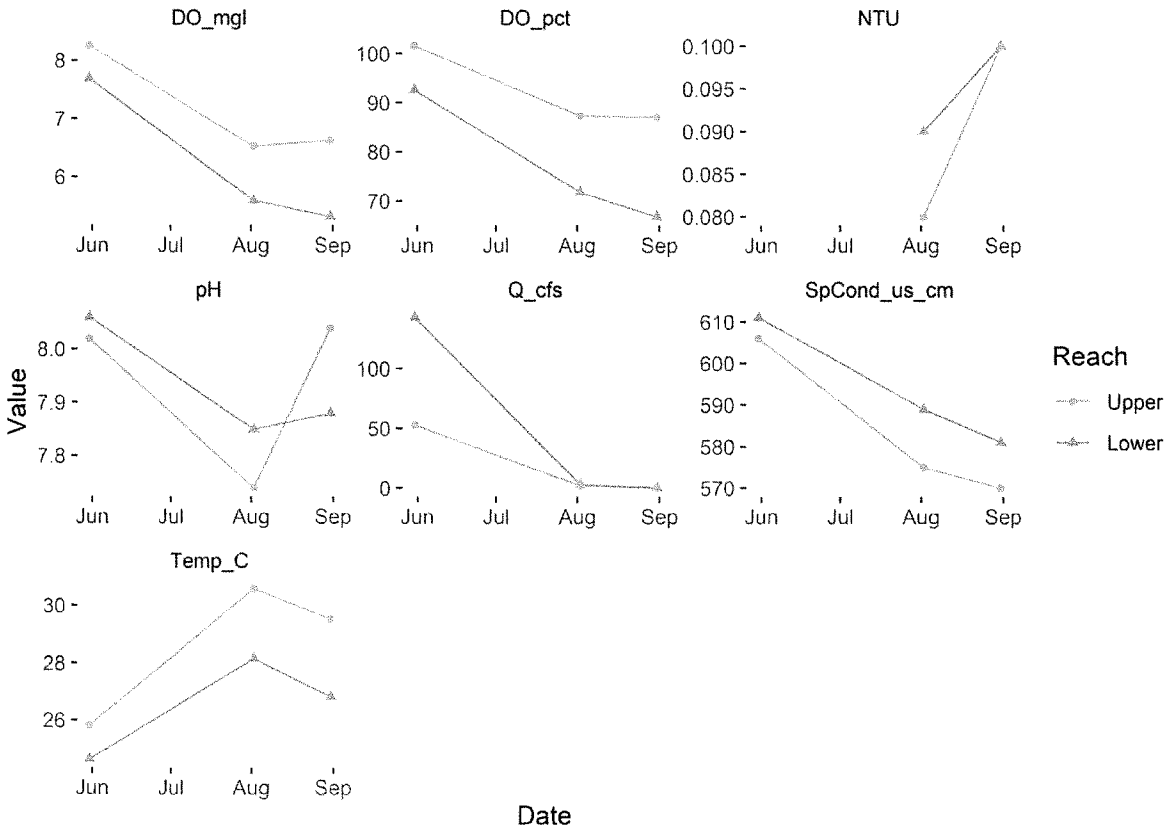


Figure Barton.2: Dissolved oxygen (DO; units are milligrams per liter (mgl) and percent saturation (pct)), turbidity (NTU, a measure of water clarity), pH (acidity), stream flow (Q_cfs, or cubic-feet per second), specific conductance (SpCond_µs_cm; units are microsiemens per centimeter), and water temperature (degrees Celsius) measured in the early morning (Lower) and mid-morning (Upper) reaches of Barton Creek during summer 2019. The tendency for the Upper reach to have higher oxygen and warmer temperatures is related to the time of day when samples were collected (later in the day at the Upper site). NTU levels are extremely low, meaning the water was very clear. NTU was not measured in May. The high value for Q_cfs at the Lower site during late May is not clear, but it may have been related to runoff from Long Branch and springs between the two reaches.

Barton Creek: EXO1 24 h (Diel) Water Quality Parameters

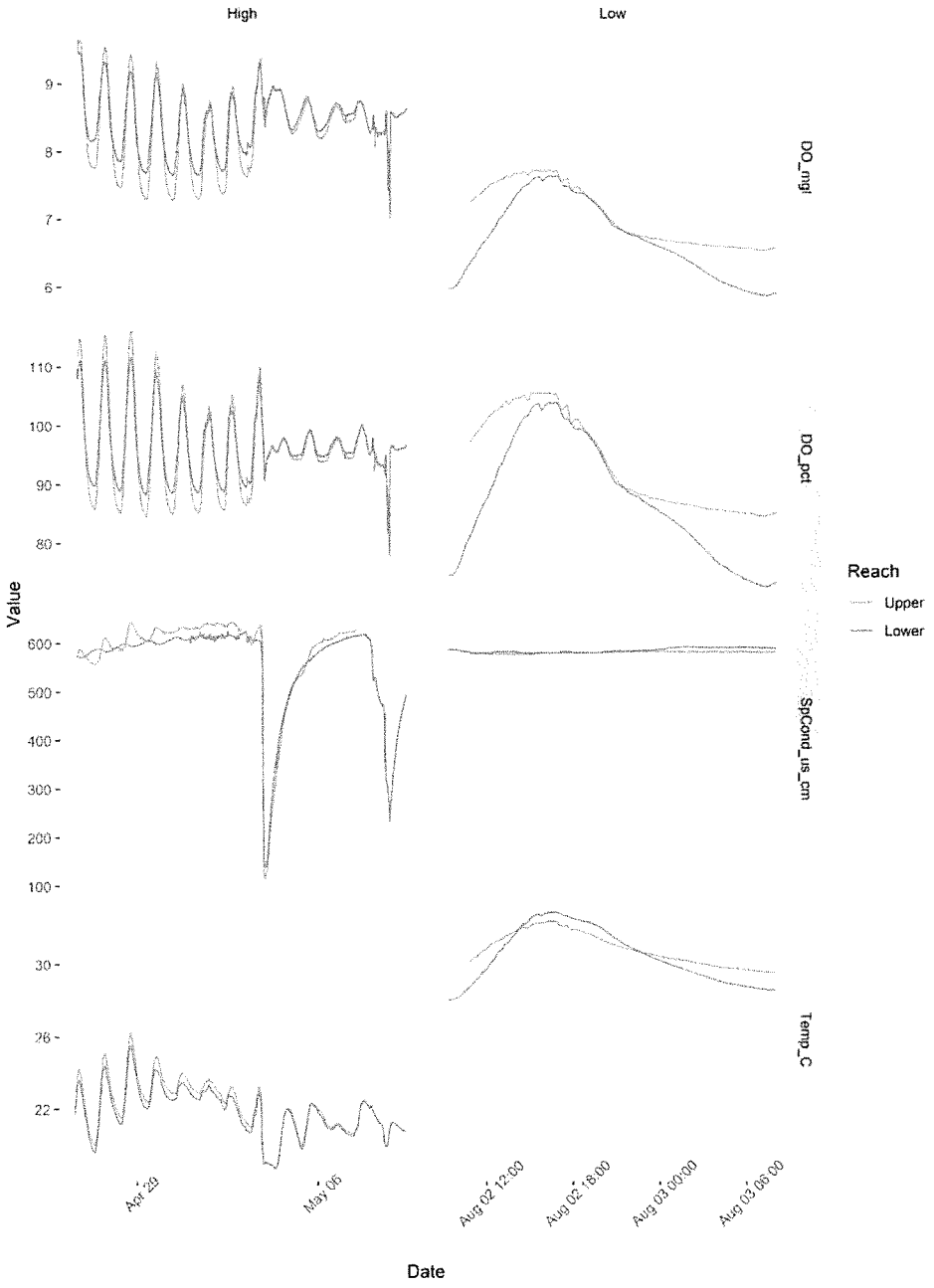


Figure Barton.3: EXO1 sondes, which were deployed to capture 15-minute intervals of dissolved oxygen (DO) and other parameters, revealed similar DO levels between the two reaches during the day and night. The High flow deployment captured an extreme high-water event on May 3, 2019, with stream flow levels jumping from ~100 cfs to nearly 30,000 cfs in a few hours. The flood event is very evident in the data, but, surprisingly, DO remained high and even showed daily oscillations that demonstrated modest levels of primary production occurring during the daylight hours even under flood conditions.

Barton Creek: Seston (Organic Matter, Phytoplankton, and Total Particulates)

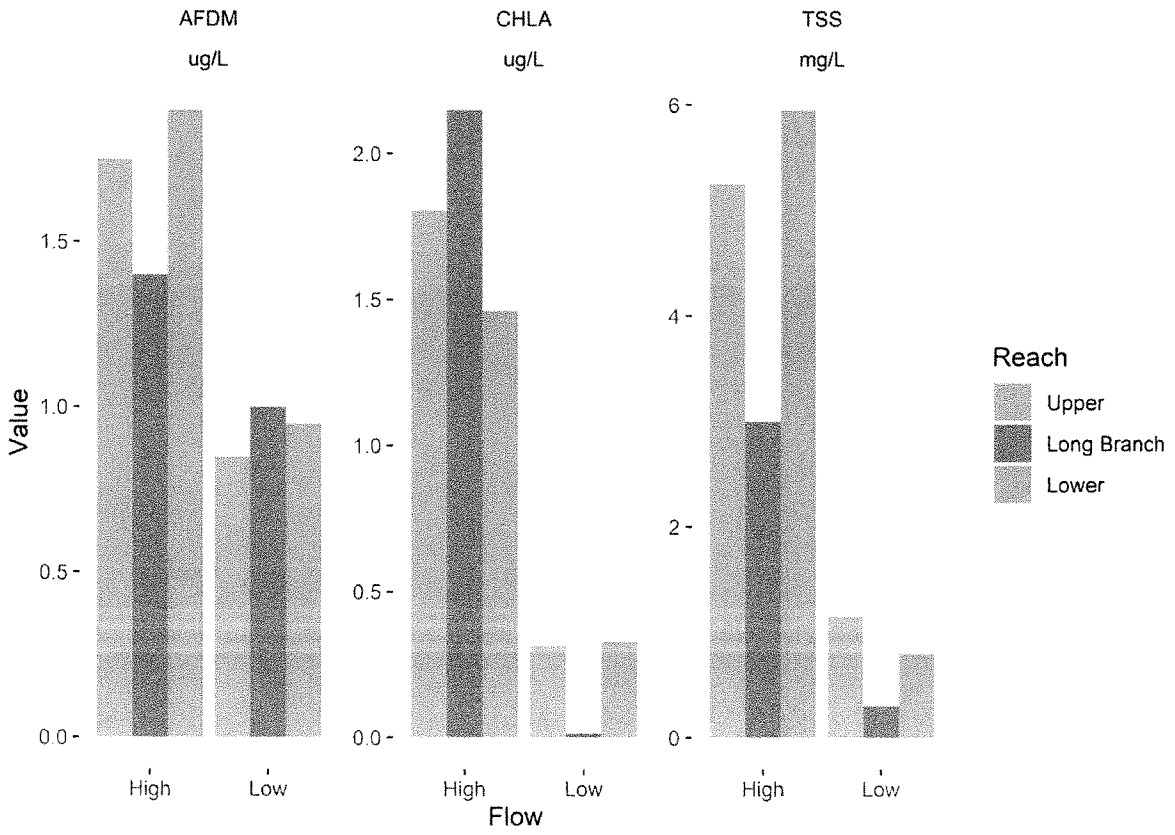


Figure Barton.4: Sestonic (sestonic refers to particles in the water column) organic matter (ash-free dry mass particulates), chlorophyll-a (phytoplankton), and total suspended solids were consistent with high-quality, reference stream conditions in both reaches and Long Branch during both high and low flow events. Sestonic chlorophyll-a peaked in high flows at ~ 2 µg/L and was < 1 µg/L during low-flow conditions. For reference, >10 µg/L of sestonic chlorophyll-a is often indicative of eutrophic (nutrient over-enriched) conditions in lakes and rivers.

Barton Creek: Periphyton (Benthic Algae) Biomass

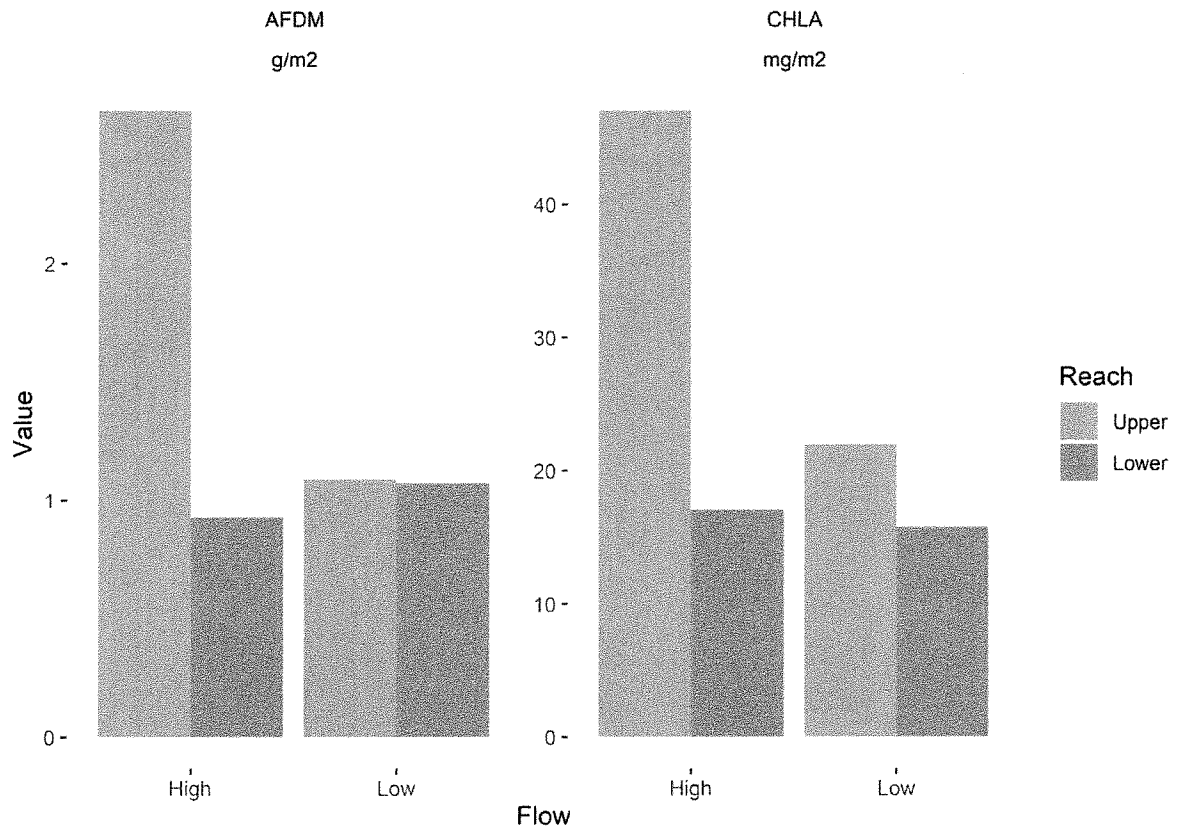


Figure Barton.5: Periphyton biomass (benthic algae, or algae attached to the stream bottom, particularly on large cobble-sized rocks) was relatively low and consistent with a low-nutrient ecosystem. Total biomass (ash-free dry mass, which the total mass of algae after removing inorganic particles such as carbonates, silt, sand, etc.) and chlorophyll-a were higher in the upper reach during high flow, but values were still quite low in both reaches. Maximum benthic chlorophyll-a (again, benthic refers to algae attached to rocks on the stream bottom) was approximately 45 mg/m^2, and around 20 mg/m^2 or less 3 out of 4 measurements..

Barton Creek: Periphyton Stable Isotopic Ratios for Carbon and Nitrogen

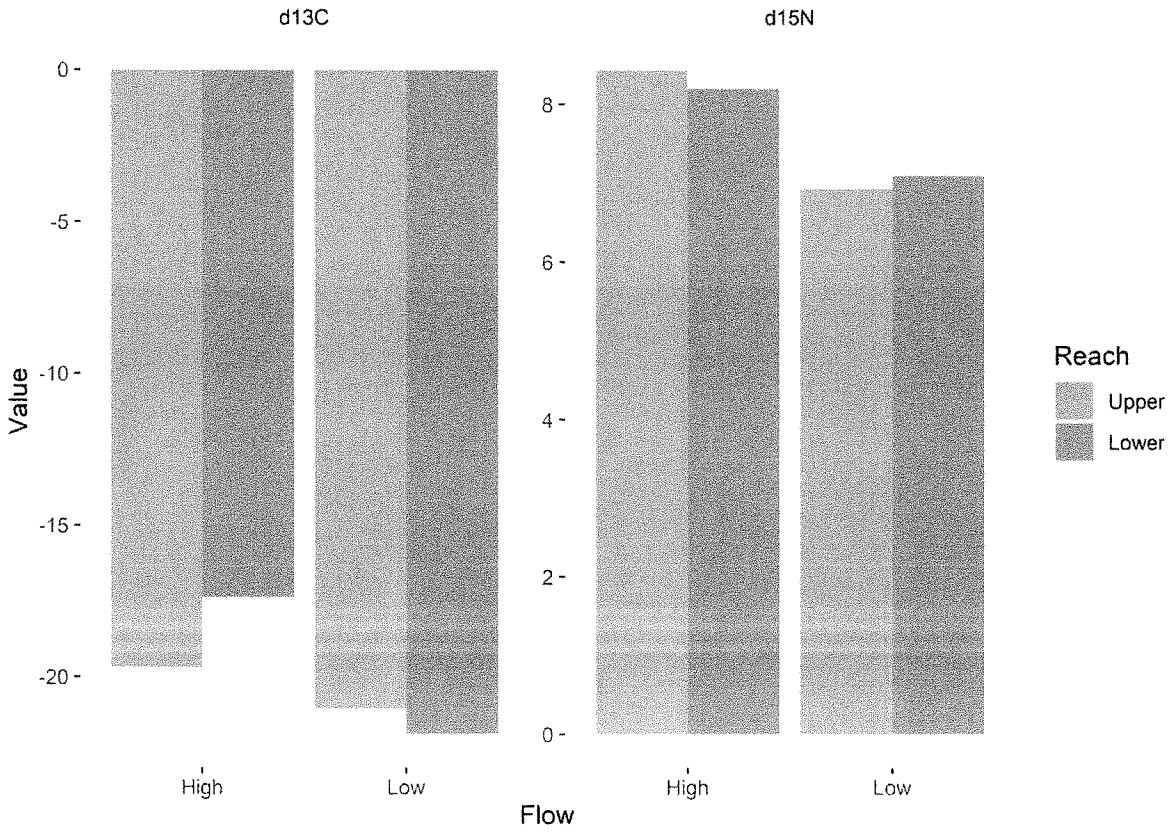


Figure Barton.6: Periphyton stable isotope values for carbon (δ13C) and nitrogen (δ15N) were similar between reaches and seasons. The stable nitrogen isotope ratio, δ15N, is often elevated when periphyton obtains its nitrogen from municipal wastewater discharges, was similar above and below Long Branch, suggesting Long Branch is not contributing a significant source of wastewater to Barton Creek at this time. However, should this change, the lower reach should show an increase in δ15N as compared to the upper reach.

Barton Creek: *Cladophora glomerata* (Nuisance Filamentous Green Alga) and Total Soft Algal Biovolume

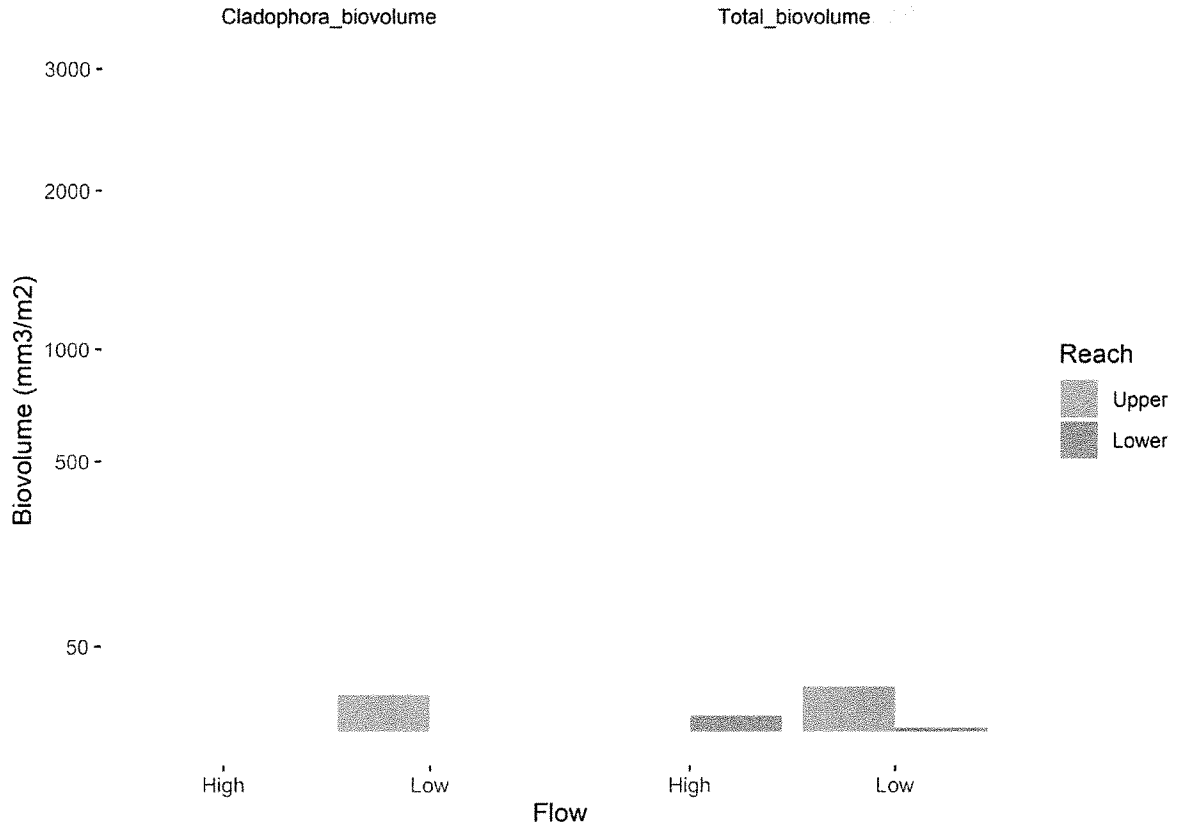


Figure Barton.7: Biomass of Cladophora glomerata, the most common nuisance filamentous green algal species associated with excessive nutrient enrichment, was extremely low in both reaches. It is normal for streams to have some Cladophora, so detecting it here was not unexpected. Total algal biovolume, excluding diatoms, was also quite low and consistent with a low-nutrient reference stream.

Barton Creek: Diatom Species Community Metrics

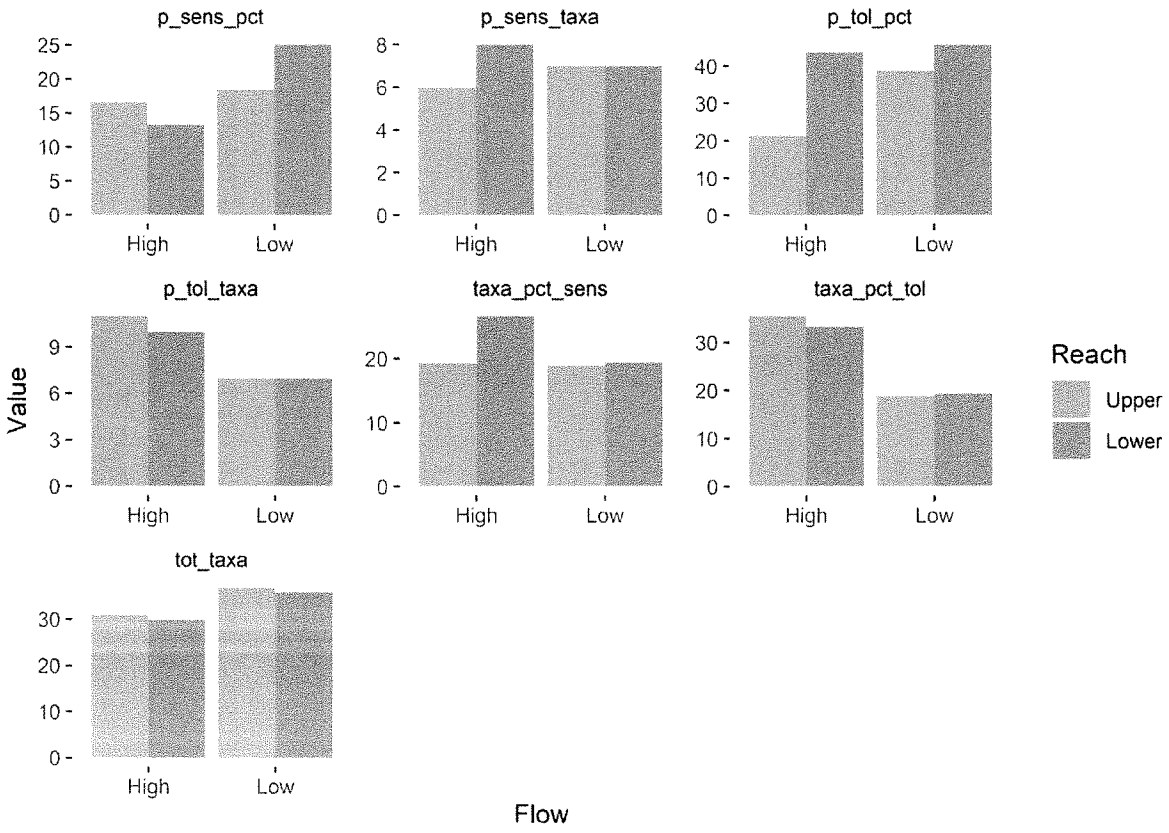


Figure Barton.8: Diatom species richness was similar between both reaches (30-35 species, depending upon season). Phosphorus (P) sensitive taxa richness and abundance was similar between reaches, as was the richness of P tolerant taxa. It is normal for P tolerant taxa to be found in low-nutrient streams; what matters more is their relative abundance, and, here, they represented well below 50% of the richness and total counts of diatoms.

Barton Creek: Macroinvertebrates Community Metrics and ALU Designation

Table Barton.1: Macroinvertebrate community composition was quite similar between reaches. Both reaches had about 30 taxa, regardless of season. Using the TCEQ Multimetric Index, both reaches were deemed "Exceptional" in terms of their Aquatic Life Use Designation based on macroinvertebrate communities.

HIGH FLOW, Upper Reach

Metric	Value	Score	4	3	2	1
Taxa Richness	**28**	4	>21	15-21	8-14	<8
# EPT	**9**	3	>9	7-9	4-6	<4
HBI	**3.58**	4	<3.77	3.77-4.52	4.53-5.27	>5.27
% Chironomidae	**5.08**	3	0.79-4.10	4.11-9.48	9.49-16.19	<0.79 or >16.19
% Most Dominant Taxa (*Chimarra*)	**39.53**	2	<22.15	22.15-31.01	31.02-39.88	>39.88
% Most Dominant FFG (FC)	**61.99**	1	<36.50	36.50-45.30	45.31-54.12	>54.12
% Predators	**9.84**	4	4.72-15.20	15.21-25.67	25.68-36.14	<4.73 or >36.14
Ratio Intolerant (<6) /Tolerant (≥6)	**3.61**	3	>4.79	3.21-4.79	1.63-3.20	<1.63
% Trichoptera as Hydropsychidae	**18.26**	4	<25.50	25.51-50.50	50.51-75.50	>75.50 or none
# Non-insect Taxa	**5**	3	>5	4-5	2-3	<2
% Collector-Gatherers	**15.10**	4	8.00-19.23	19.24-30.46	30.47-41.68	<8.00 or >41.68
% Elmidae	**2.93**	4	0.88-10.04	10.05-20.08	20.09-30.12	<0.88 or >30.12
Aquatic Life Use Designation	**EXCEPTIONAL**	39				
Exceptional	>36					
High	29-36					
Intermediate	22-28					
Low	<22					

High Flow, Lower Reach

Metric	Value	Score	4	3	2	1
Taxa Richness	**26**	4	>21	15-21	8-14	<8
# EPT	**8**	3	>9	7-9	4-6	<4
HBI	**3.34**	4	<3.77	3.77-4.52	4.53-5.27	>5.27
% Chironomidae	**2.49**	4	0.79-4.10	4.11-9.48	9.49-16.19	<0.79 or >16.19
% Most Dominant Taxa (*Chimarra*)	**47.96**	1	<22.15	22.15-31.01	31.02-39.88	>39.88
% Most Dominant FFG (FC)	**62.14**	1	<36.50	36.50-45.30	45.31-54.12	>54.12
% Predators	**9.15**	4	4.72-15.20	15.21-25.67	25.68-36.14	<4.73 or >36.14
Ratio Intolerant (<6) /Tolerant (≥6)	**3.84**	3	>4.79	3.21-4.79	1.63-3.20	<1.63
% Trichoptera as Hydropsychidae	**18.02**	4	<25.50	25.51-50.50	50.51-75.50	>75.50 or none
# Non-insect Taxa	**4**	3	>5	4-5	2-3	<2
% Collector-Gatherers	**14.70**	4	8.00-19.23	19.24-30.46	30.47-41.68	<8.00 or >41.68
% Elmidae	**3.45**	4	0.88-10.04	10.05-20.08	20.09-30.12	<0.88 or >30.12
Aquatic Life Use Designation	**EXCEPTIONAL**	39				
Exceptional	>36					
High	29-36					
Intermediate	22-28					
Low	<22					

LOW FLOW, Upper Reach

Metric	VALUE	Score	4	3	2	1
Taxa Richness	**29**	4	>21	15-21	8-14	<8
# EPT	**10**	4	>9	7-9	4-6	<4
HBI	**2.64**	4	<3.77	3.77-4.52	4.53-5.27	>5.27
% Chironomidae	**2.28**	4	0.79-4.10	4.11-9.48	9.49-16.19	<0.79 or >16.19
% Most Dominant Taxa (*Chimarra*)	**48.11**	1	<22.15	22.15-31.01	31.02-39.88	>39.88
% Most Dominant FFG (FC)	**54.08**	2	<36.50	36.50-45.30	45.31-54.12	>54.12
% Predators	**7.92**	4	4.72-15.20	15.21-25.67	25.68-36.14	<4.73 or >36.14
Ratio Intolerant (<6) /Tolerant (≥6)	**6.90**	4	>4.79	3.21-4.79	1.63-3.20	<1.63
% Trichoptera as Hydropsychidae	**7.00**	4	<25.50	25.51-50.50	50.51-75.50	>75.50 or none
# Non-insect Taxa	**2**	2	>5	4-5	2-3	<2
% Collector-Gatherers	**19.93**	3	8.00-19.23	19.24-30.46	30.47-41.68	<8.00 or >41.68
% Elmidae	**7.28**	4	0.88-10.04	10.05-20.08	20.09-30.12	<0.88 or >30.12
Aquatic Life Use Designation	**EXPECTIONAL**	40				
Exceptional	>36					
High	29-36					
Intermediate	22-28					
Low	<22					

Low Flow, Lower Reach

Metric	Value	Score	4	3	2	1
Taxa Richness	**31**	4	>21	15-21	8-14	<8
# EPT	**10**	4	>9	7-9	4-6	<4
HBI	**3.07**	4	<3.77	3.77-4.52	4.53-5.27	>5.27
% Chironomidae	**2.57**	4	0.79-4.10	4.11-9.48	9.49-16.19	<0.79 or >16.19
% Most Dominant Taxa (*Chimarra*)	**32.67**	2	<22.15	22.15-31.01	31.02-39.88	>39.88
% Most Dominant FFG (FC)	**40.31**	3	<36.50	36.50-45.30	45.31-54.12	>54.12
% Predators	**15.44**	3	4.72-15.20	15.21-25.67	25.68-36.14	<4.73 or >36.14
Ratio Intolerant (<6) /Tolerant (≥6)	**3.51**	3	>4.79	3.21-4.79	1.63-3.20	<1.63
% Trichoptera as Hydropsychidae	**11.93**	4	<25.50	25.51-50.50	50.51-75.50	>75.50 or none
# Non-insect Taxa	**4**	3	>5	4-5	2-3	<2
% Collector-Gatherers	**22.95**	3	8.00-19.23	19.24-30.46	30.47-41.68	<8.00 or >41.68
% Elmidae	**9.75**	4	0.88-10.04	10.05-20.08	20.09-30.12	<0.88 or >30.12
Aquatic Life Use Designation	**EXCEPTIONAL**	41				
Exceptional	>36					
High	29-36					
Intermediate	22-28					
Low	<22					

Barton Creek: Macroinvertebrate Densities

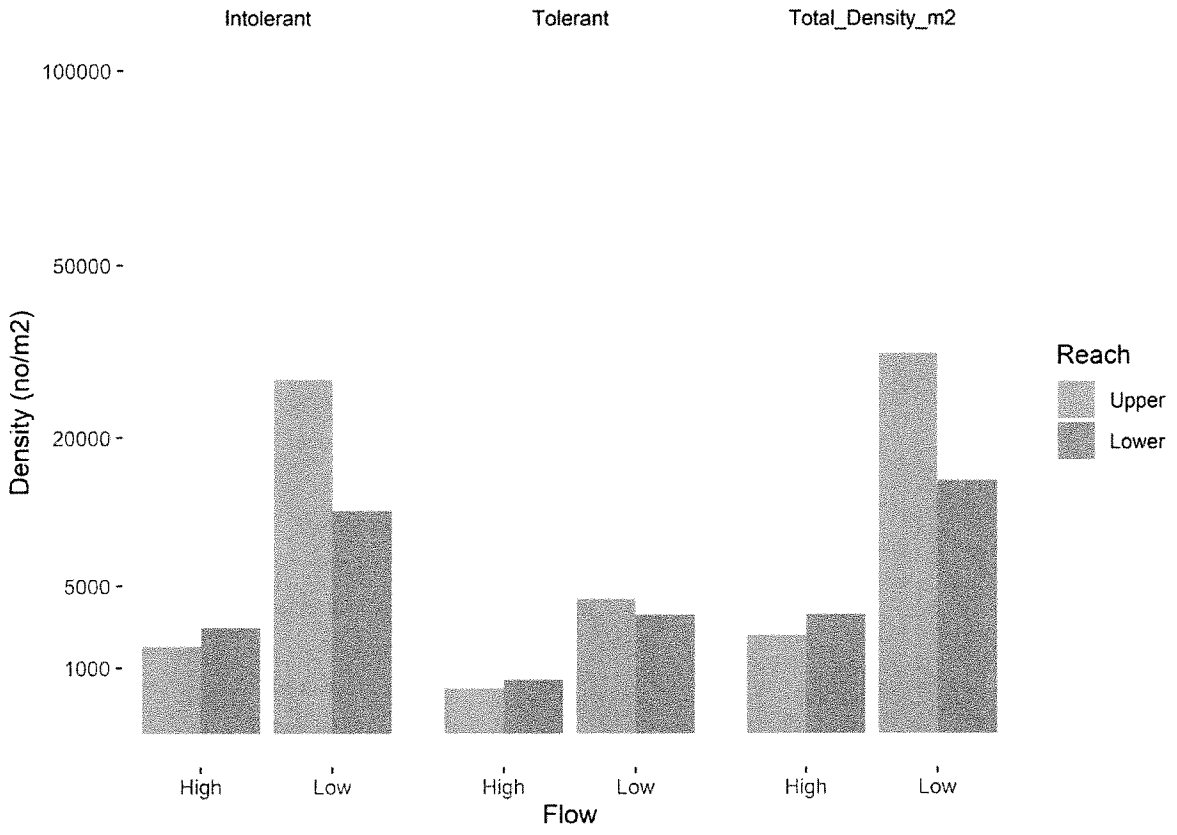


Figure Barton.9: The density of macroinvertebrates was low during the high flow event, which was likely due to the huge scouring of the stream channel during the record flood about 1 month before our sampling. The fact that the stream still supported relatively high numbers of species and rated exceptional after this flood is a testament to the high-quality habitat and water found in this stretch of Barton Creek.

Barton Creek: Macroinvertebrate Taxonomic Composition

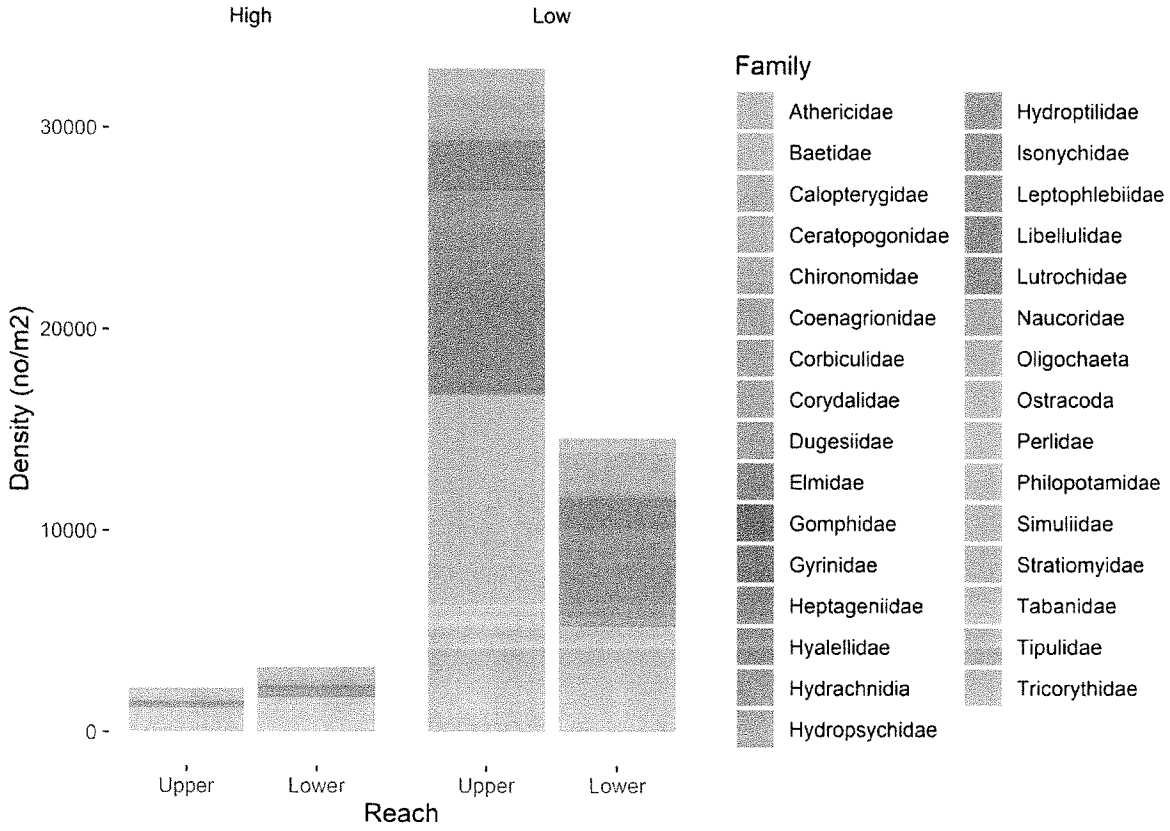


Figure Barton.10: Stacked-bar chart showing the total densities of macroinvertebrates by taxonomic family. Densities differed markedly between high and low flow events because the former occurred within 1 month of a large flood, thus macroinvertebrates had yet to recover completely. However, the proportion of the different families between Upper and Lower reaches was nearly identical within the High and Low flow events, respectively.

Barton Creek: Fish Assemblage Composition

Table Barton.2: Fish assemblages were consistent with high quality Hill Country streams. Species such as Guadalupe Bass, a species endemic to a small region of the Hill Country, were found in both reaches, as were numerous other native species typical of streams in the region.

Barton Creek, Lower		
Species	Count, Total	Count, Juveniles
Blacktail Shiner	135	10
Bluegill	58	19
Central Stoneroller	87	0
Channel Catfish	32	32
Green Sunfish	1	0
Guadalupe Bass	2	2
Largemouth Bass	12	6
Lepomis spp.	8	8
Longear Sunfish	13	2
Redbreast Sunfish	19	1
Rio Grande Cichlid	12	11
Western Mosquitofish	11	0
Yellow Bullhead	9	7
Total	**399**	**98**
Barton Creek, Upper		
Blacktail Shiner	148	5
Bluegill	21	10
Central Stoneroller	160	0
Channel Catfish	54	54
Green Sunfish	1	0
Guadalupe Bass	3	3
Largemouth Bass	5	2
Lepomis spp.	9	8
Longear Sunfish	39	12
Redbreast Sunfish	6	0
Rio Grande Cichlid	7	5
Western Mosquitofish	15	0
Total	**468**	**99**

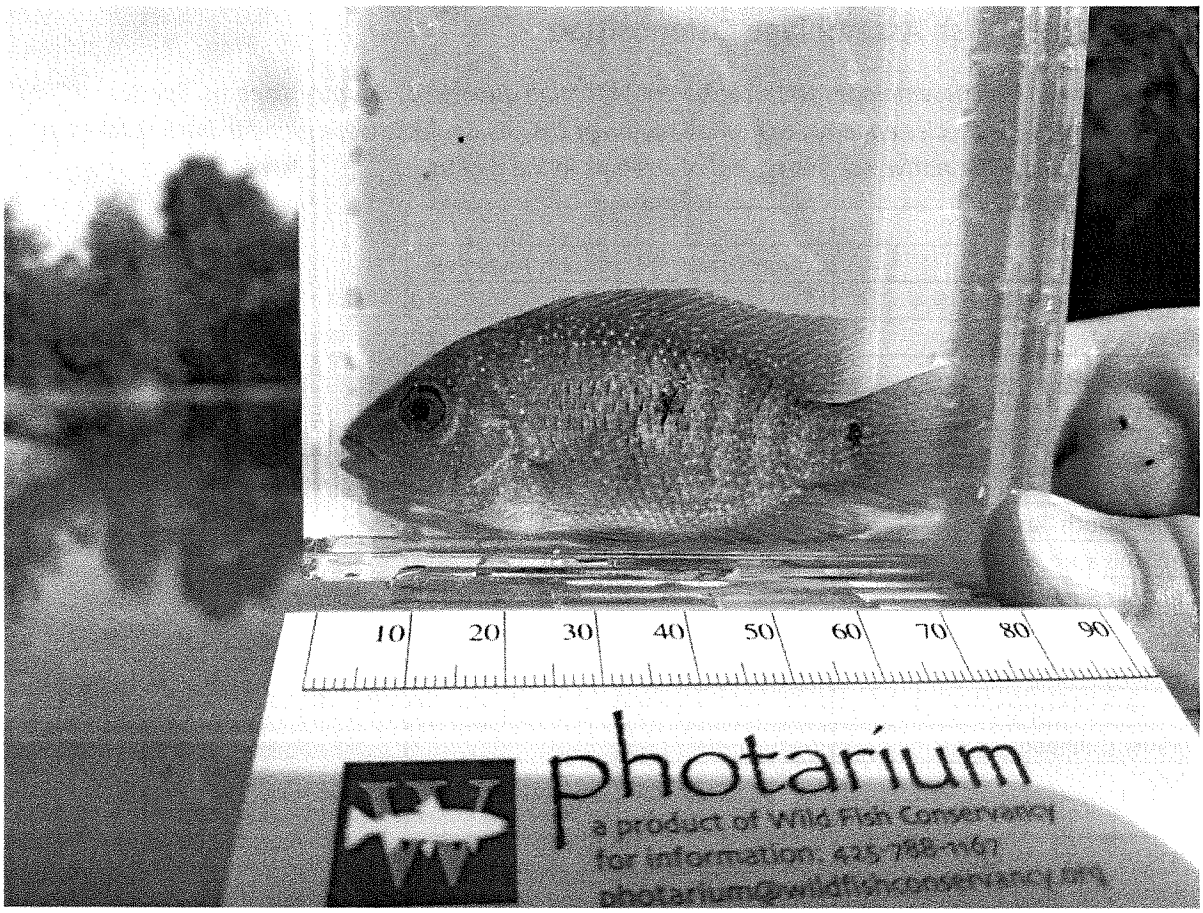


Image Barton.1: Rio Grande Cichlid from Barton Creek, Upper Reach, September 2019.

Results

BLANCO RIVER

Summary

Blanco River Upper and Lower Reaches were relatively similar in physical habitat and stream flow but differed substantially in some of their chemical (e.g., nutrient) and biological (e.g. algal biomass) characteristics during both high (April-May) and low (August-September) flow sampling events. These differences appeared to be related to nutrient enrichment from wastewater or other source immediately upstream of the lower reach at Blanco Settlement.

Upper Blanco phosphorus levels were consistent with a high-quality, reference stream in the Edwards Plateau or Cross Timbers Ecoregions of central Texas, with total and orthophosphate (PO_4-P)-phosphorus values < 10 µg/L. Nitrite+nitrate-N and total N (TN) values were also quite low during April and August, but ticked up in September to levels that were higher than typical of a reference stream in the region. Water flow was extremely low at this time, and fish excretion in pools may have contributed to the elevated nitrogen levels observed in the upper reach, as this is not unusual during very low flow periods in streams in the region.

In contrast, lower Blanco nutrient levels, particularly phosphorus, were elevated above levels typical of reference streams in the region. Total phosphorus (TP) ranged from 17 to over 40 µg/L. TP concentrations above 15-20 are within the threshold zone for rapid, nonlinear changes in algal assemblages in streams in the region. The lowest value (17 µg/L) was observed in April during a large algal bloom, so it is likely that phosphorus was being pulled from the water column by the algae, bringing the level down. The highest value was during the low flow period in September when algal biomass was much lower due to summer scouring events that washed most of the filamentous algae away. This suggests that the load of phosphorus coming from upstream is triggering blooms and being sequestered by algae. Once algal filaments are washed away by high flows, phosphorus levels increase because less algae are present to remove it from the water column.

Dissolved oxygen levels were generally high and remained at or above levels that are supportive of natural biological communities in Texas streams in both reaches; however, nighttime DO dropped below 5 mg/L at the lower reach during the April sampling event that coincided with the bloom. EXO1 sondes, which were deployed to capture 15-minute intervals of dissolved oxygen and other parameters, revealed much larger swings in DO levels at the lower reach, consistent with higher levels of primary production (i.e., algal growth).

Sestonic organic matter (ash-free dry mass particulates), chlorophyll-a (phytoplankton), and total suspended solids were consistently higher in the lower reach. The levels of sestonic chlorophyll-a at the lower reach exceeded 5 µg/L during the high flow event (algal bloom); levels above 5 µg/L are unusual for Hill Country streams and are visible to the naked eye (that is, the water looks colored by algae and loses its clarity). The upper reach had much lower sestonic chlorophyll-a in the spring, also suggesting that there was a source of nutrients causing the bloom at the lower reach that was not present at the upper reach.

Periphyton (benthic algae) biomass was much higher in the lower (Blanco Settlement) reach during both events. Chlorophyll-a exceeded 200 mg/m^2 at the lower reach during the early season sampling (during the bloom), whereas the upper supported < 50 mg/m^2 during both seasons.

Periphyton stable isotope values for carbon (δ13C) and nitrogen (δ15N) were also different between reaches and seasons. Stable nitrogen isotopic ratios, which are typically elevated in periphyton where it obtains its nitrogen from municipal wastewater discharges, was approximately 3 units higher at the lower than upper reach, exceeding values of 10 and 11 δ15N during the high and low flow events, respectively, at the lower reach. These levels are **highly indicative** of nitrogen sources from wastewater. Such large differences between reaches also suggest that the sources of nitrogen are much different between reaches.

Biomass of *Cladophora glomerata*, the most common nuisance filamentous green algal species associated with excessive nutrient enrichment, was quite high during the early, high flow event at the lower reach, again consistent with nutrient enrichment from wastewater. *Cladophora* proliferates near wastewater discharges, and this result implies that wastewater was likely causing the blooms observed at the lower reach during April 2019. During the latter, low-flow event in August, moderate levels of *Cladophora* biovolume were identified at the lower reach whereas **none** was found at the upper reach.

Diatom species composition also revealed substantial differences between the two reaches. The percentage of phosphorus (P) sensitive taxa richness and abundance was much higher at the upper reach, whereas the lower reach had large numbers of P-tolerant taxa. Diatoms are very sensitive to P enrichment, so this finding strongly implies that the lower reach was receiving excessive P enrichment from a source not found at the upper reach.

Macroinvertebrate community composition also differed dramatically between reaches. Using the TCEQ Multimetric Index, the lower reach was deemed "High" in terms of the Aquatic Life Use Designation based on macroinvertebrate communities during April 2019. However, this result seems dubious given the fact that the density of macroinvertebrates at the lower reach during the April algal bloom was abnormally high, approaching 100,000 individuals/m^2, and this was driven almost entirely by taxa that are typically associated with organic pollution and wastewater discharges. Flatworms (Dugesiidae), air-breathing snails (Physidae), segmented worms (Oligochaeta), and a very tolerant mayfly genus (*Baetis*) dominated the densities and biomass at the lower reach during April 2019. Note that TCEQ considers *Baetis* to be "Intolerant" despite the fact that it is arguably the most ubiquitous, tolerant mayfly found in streams throughout the USA (e.g., they even thrive in Appalachian streams that are highly impacted by runoff from coal mines).

Fish assemblages were relatively similar between reaches in terms of species composition. However, numerical abundance of fish, particularly fish that graze heavily on algae (e.g., central stonerollers) and shiner species that eat drifting *Baetis* nymphs were particularly abundant at the lower reach. The upper reach had low numbers of fish but several large individuals of largemouth bass, longear sunfish, redear sunfish, and good numbers of juvenile Guadalupe bass.

Blanco River: Nutrients

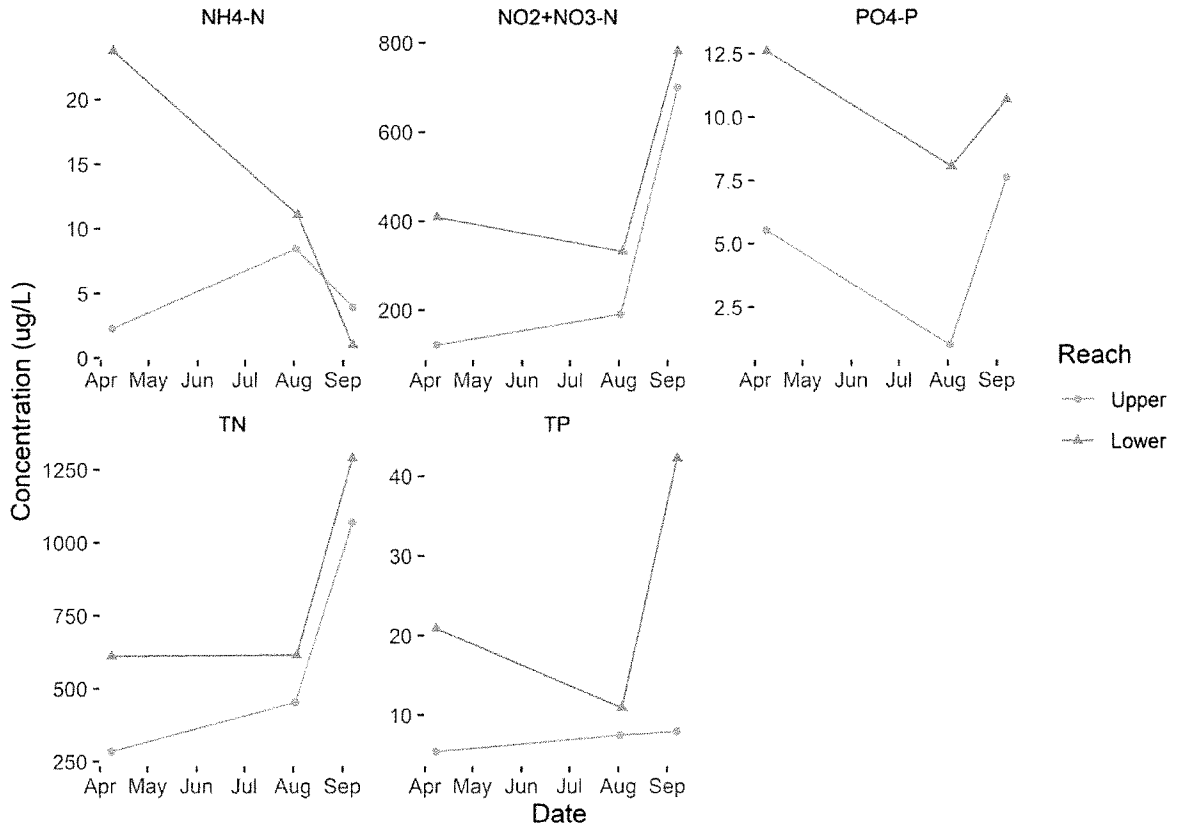


Figure Blanco.1: Upper Blanco phosphorus levels were consistent with a high-quality, reference stream in the Edwards Plateau or Cross Timbers Ecoregions of central Texas, with total and orthophosphate (PO_4-P)-phosphorus values < 10 µg/L. Nitrite+nitrate-N and total N (TN) values were also quite low during April and August, but ticked up in September to levels that were higher than typical of a reference stream in the region. In contrast, lower Blanco nutrient levels, particularly phosphorus, were elevated above levels typical of reference streams in the region. Total phosphorus (TP) ranged from 17 to over 40 µg/L. TP concentrations above 15-20 are within the threshold zone for rapid, nonlinear changes in algal assemblages in streams in the region. The lowest value (17 µg/L) was observed in April during a large algal bloom, so it is likely that phosphorus was being pulled from the water column by the algae, bringing the level down. The highest value was during the low flow period in September when algal biomass was much lower due to summer scouring events that washed most of the filamentous algae away.

Blanco River: YSI EXO1 Data Sonde Parameters, Instantaneous

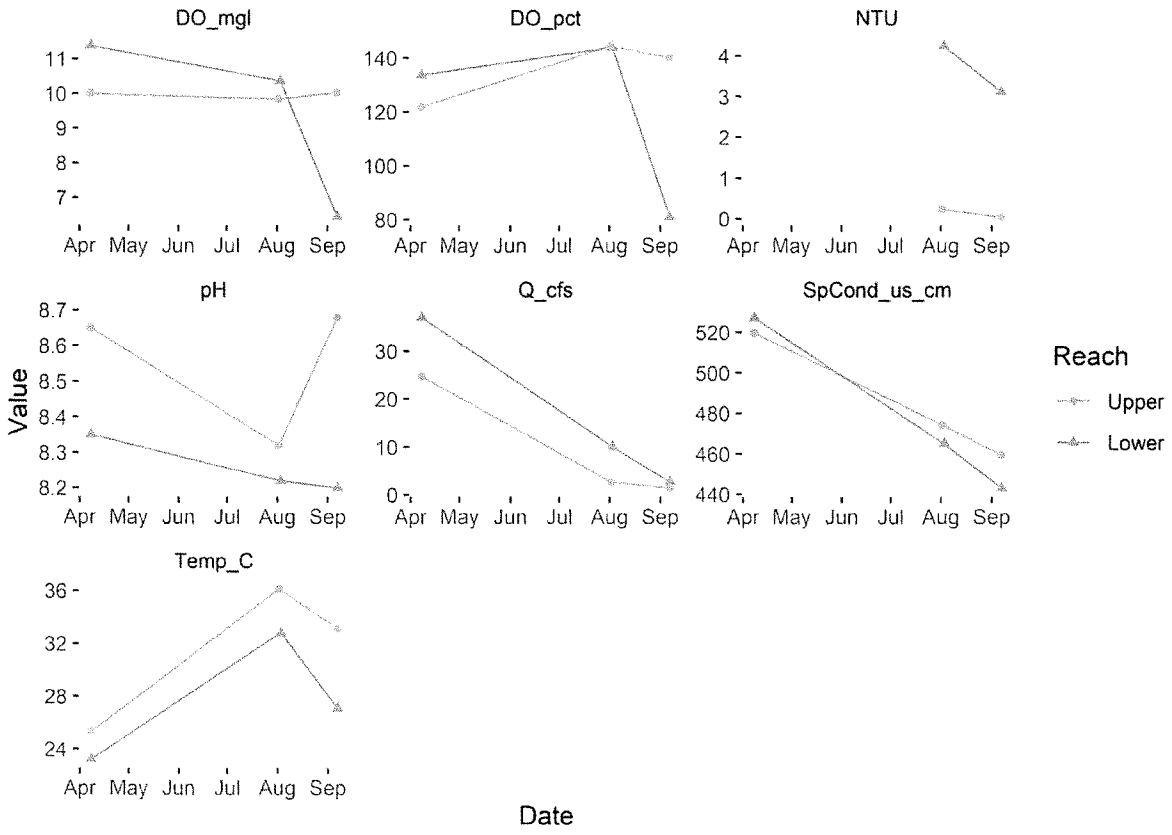


Figure Blanco.2: Dissolved oxygen (DO; units are milligrams per liter (mgl) and percent saturation (pct)), turbidity (NTU, a measure of water clarity), pH (acidity), stream flow (Q_cfs, or cubic-feet per second), specific conductance (SpCond_us_cm; units are microsiemens per centimeter), and water temperature (degrees Celsius) measured in the early morning (Lower) and mid-morning (Upper) reaches of Blanco River during summer 2019. The tendency for the Upper reach to have warmer temperatures is related to the time of day when samples were collected (later in the day at the Upper site). NTU levels at Upper reach (reference) were extremely low, meaning the water was very clear; however, NTU levels were much higher at the Lower reach, indicating cloudy water. NTU was not measured in May. The two reaches were otherwise quite similar in stream flow, specific conductance and pH (although slightly higher pH at Upper reach).

Blanco River: EXO1 24 h (Diel) Water Quality Parameters

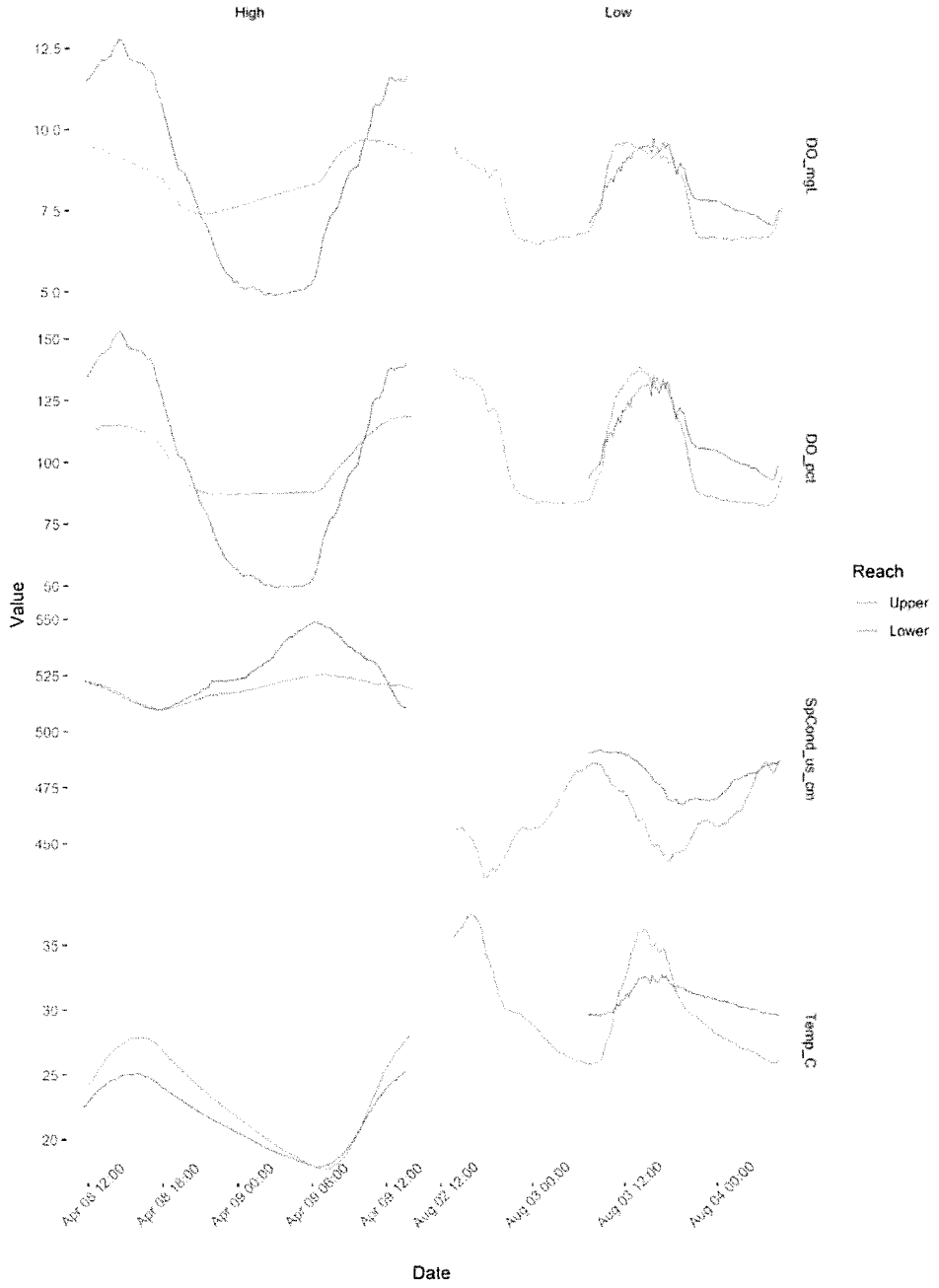


Figure Blanco.3: EXO1 sondes, which were deployed to capture 15-minute intervals of dissolved oxygen and other parameters, revealed much larger swings in dissolved oxygen (DO) levels at the lower reach, consistent with higher levels of primary production (i.e., algal growth). Dissolved oxygen levels were generally high and remained at or above levels that are supportive of natural biological communities in Texas streams in both reaches; however, nighttime DO dropped below 5 mg/L at the lower reach during the April sampling event that coincided with the bloom.

Blanco River: Seston (Organic Matter, Phytoplankton, and Total Particulates in Water Column)

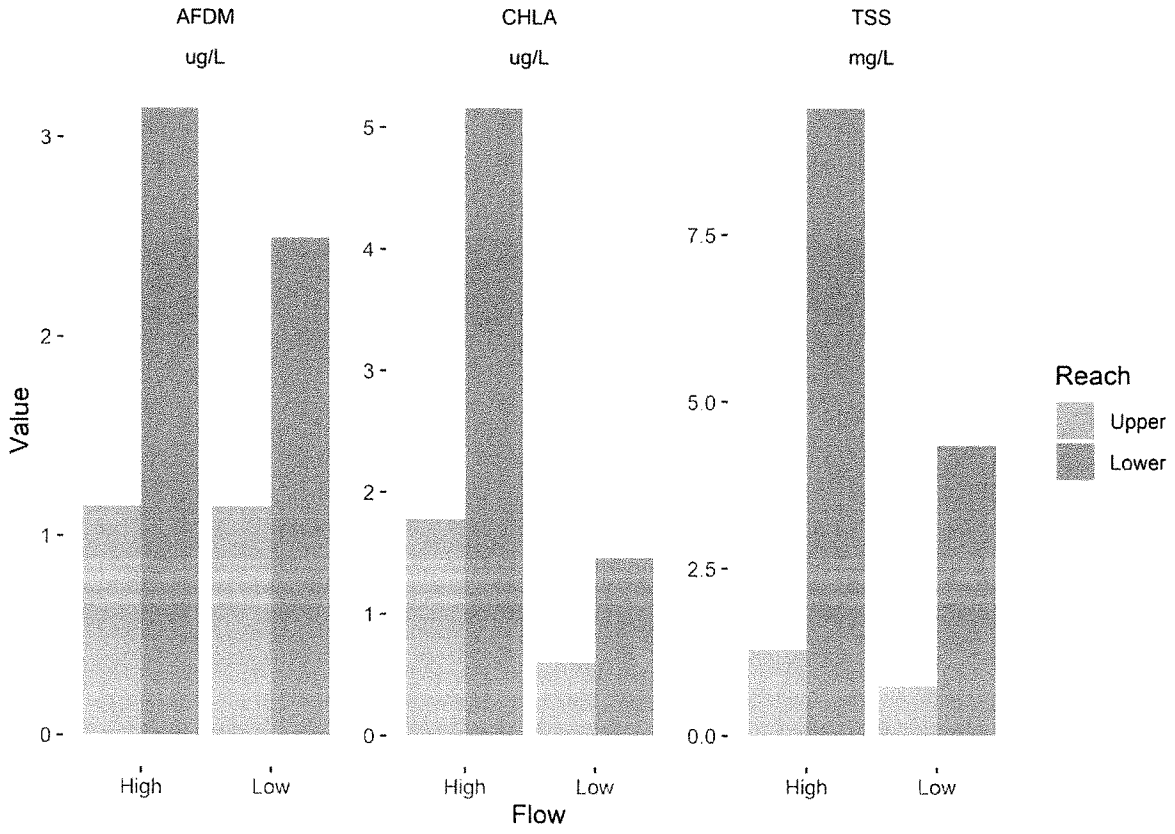


Figure Blanco.4: Sestonic organic matter (ash-free dry mass particulates floating in the water column), chlorophyll-a (phytoplankton or other algal cells in water column), and total suspended solids (TSS, all particulates in water column) were consistently higher in the lower reach. The levels of sestonic chlorophyll-a at the lower reach exceeded 5 µg/L during the high flow event (algal bloom); levels above 5 µg/L are unusual for Hill Country streams and are visible to the naked eye (that is, the water looks colored by algae and loses its clarity). The upper reach had much lower sestonic chlorophyll-a in the spring, also suggesting that there was a source of nutrients causing the bloom at the lower reach that was not present at the upper reach.

Blanco River: Periphyton (Benthic Algae) Biomass

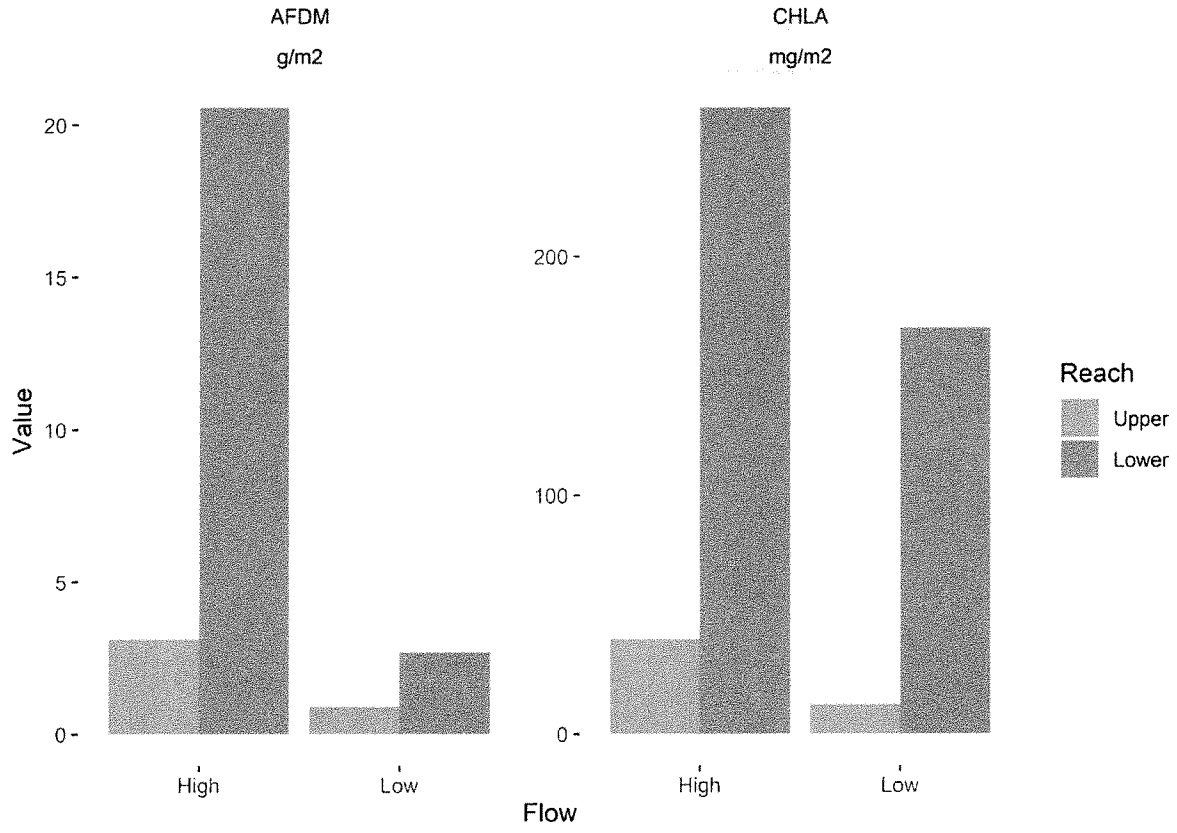


Figure Blanco.5: Periphyton (benthic algae, or algae attached to rocks on stream bottom) biomass was much higher in the lower (Blanco Settlement) reach during both events. Chlorophyll-a exceeded 200 mg/m^2 at the lower reach during the early season sampling (during the bloom), whereas the upper supported < 50 mg/m^2 during both seasons. .

Blanco River: Periphyton Stable Isotopic Ratios for Carbon and Nitrogen

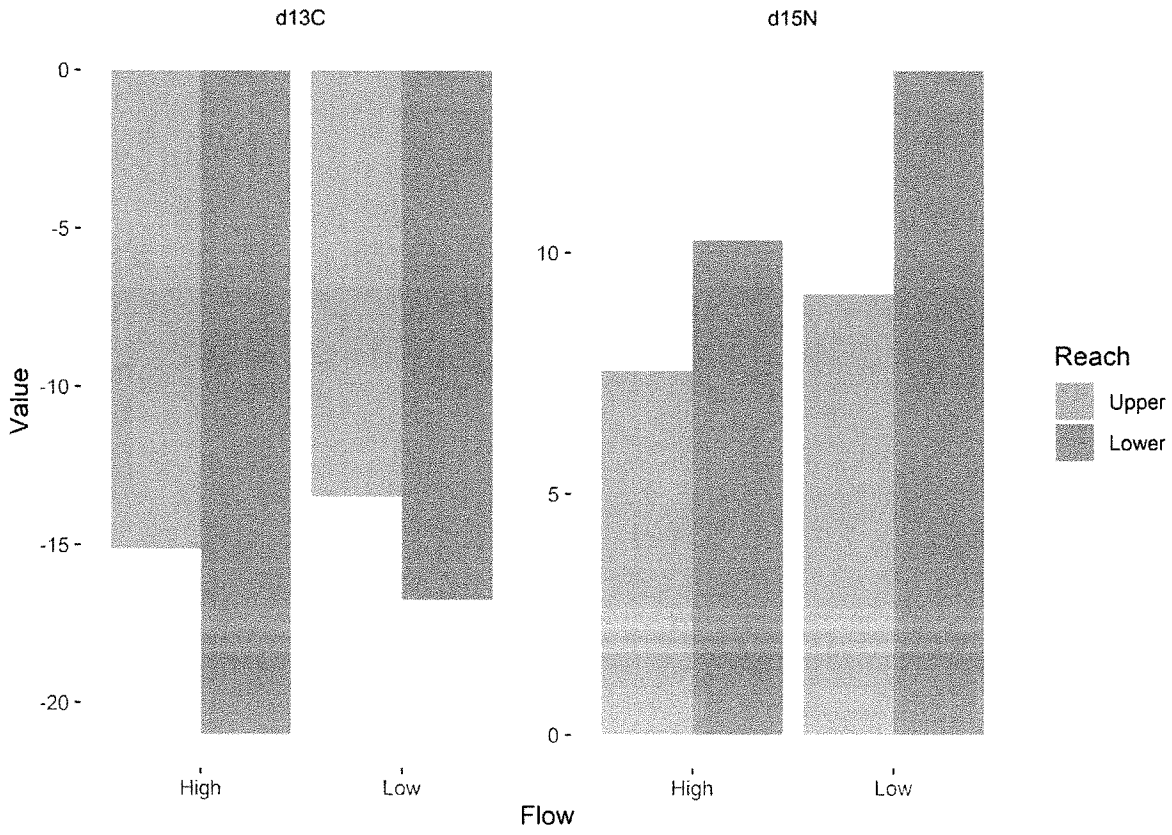
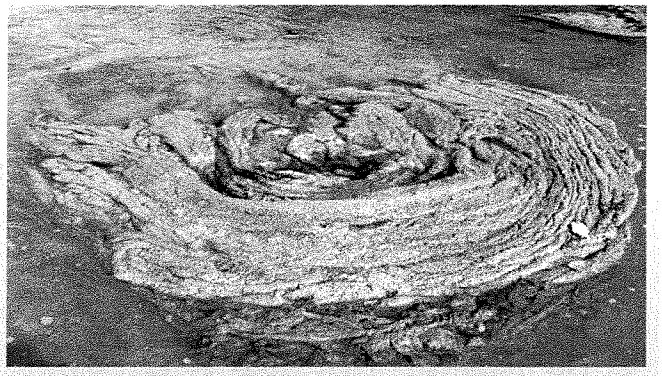


Figure Blanco.6: Periphyton stable isotope values for carbon (δ13C) and nitrogen (δ15N) were different between reaches and seasons. Stable nitrogen isotopic ratios, which are typically elevated in periphyton where it obtains its nitrogen from municipal wastewater discharges, was approximately 3 units higher at the lower than upper reach, exceeding values of 10 and 11 δ15N during the high and low flow events, respectively, at the lower reach. These levels are highly indicative of nitrogen sources from wastewater. Such large differences between reaches also suggest that the sources of nitrogen are much different between reaches.

Conclusion

- Blanco River study results consistent with multiple published research papers concluding that total phosphorus must be kept below 15 to 20 micrograms/L in order to protect native aquatic communities and prevent excessive algae growth



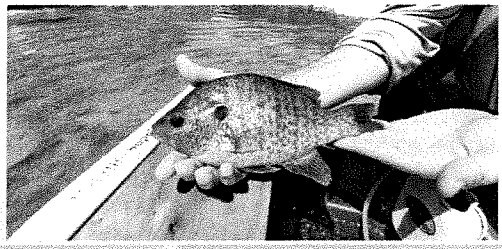
Massive aggregation of filamentous green algae (Cladophora) at Blanco Settlement, April 2019

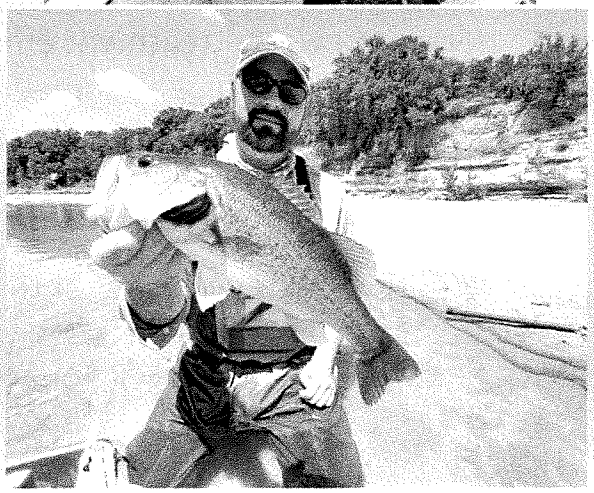
Summary

- Nutrients, esp phosphorus, were elevated at Blanco Settlement
- Nuisance algae was much more abundant at Blanco Settlement
- Nitrogen isotopes showed that nutrients were coming from wastewater at Blanco Settlement
- Macroinvertebrates associated with wastewater proliferated at Blanco Settlement
- Fish were dominated by small “baitfish” and juvenile sunfish at Blanco Settlement, whereas larger gamefish were found at upstream site.

Blanco River: Fish

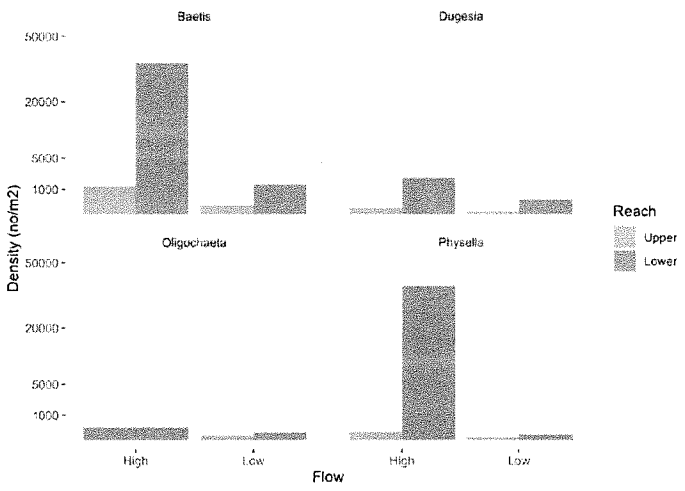
- Fish were more abundant at Blanco Settlement, but dominated by stonerollers (a fish that eats algae), juvenile sunfish (longears, bluegill), and blacktail shiners.
- Fewer, but larger fish were collected at the Goldwin-Smith site, including redear sunfish and largemouth bass.





Blanco River: Macroinvertebrates

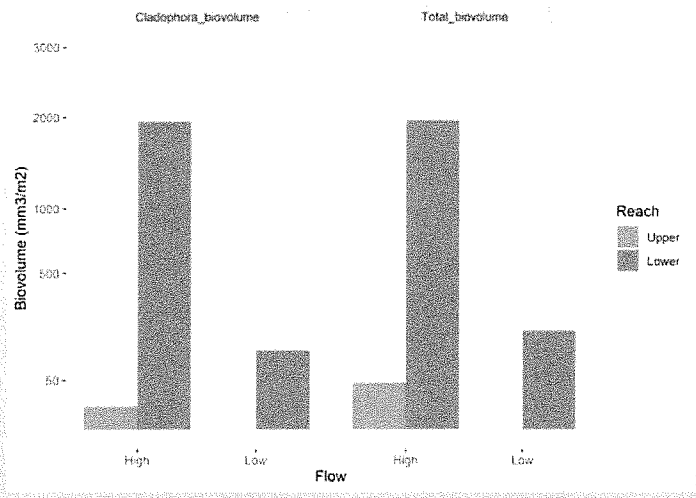
- Aquatic macroinvertebrates are key indicators of water quality
- We found that densities of macroinvertebrate taxa typically found near wastewater treatment effluent discharges were higher, sometimes many times higher, at Blanco Settlement than at the upstream site
- Overall densities of macroinvertebrates were several times higher at the lower site, but again, dominated by weedy taxa that are indicators of poor water quality



Baetis=tolerant mayfly
Dugesia=flatworm
Oligochaeta=segmented worm
Physella=lunged snail

Blanco River: Biovolume of Algae

- Biovolume is a way another way to estimate the amount of algae on the stream bottom.
- Barbara Winsborough, a world-class taxonomist, estimated biovolume for all species of algae from samples we collected from the stream bottom.
- *Cladophora*, the most common nuisance species of green algae, was many times more abundant at Blanco Settlement than at the upstream site.
- *Cladophora* contributed almost all of the biovolume of algae at the lower site.



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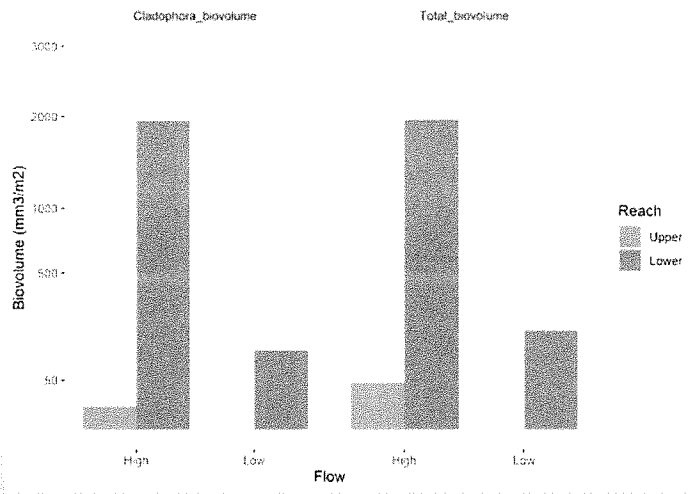
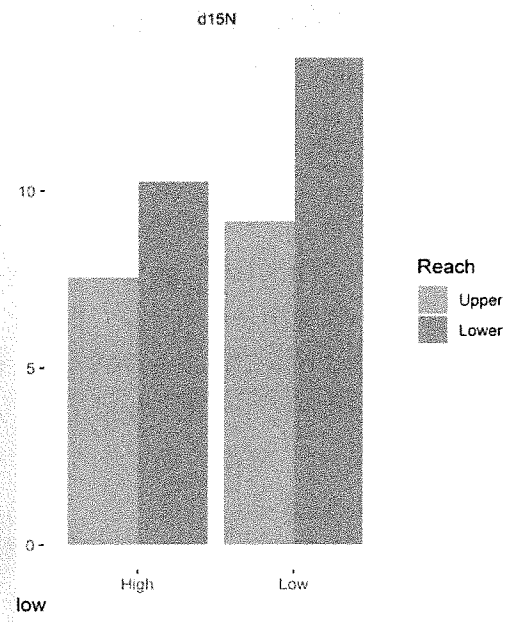


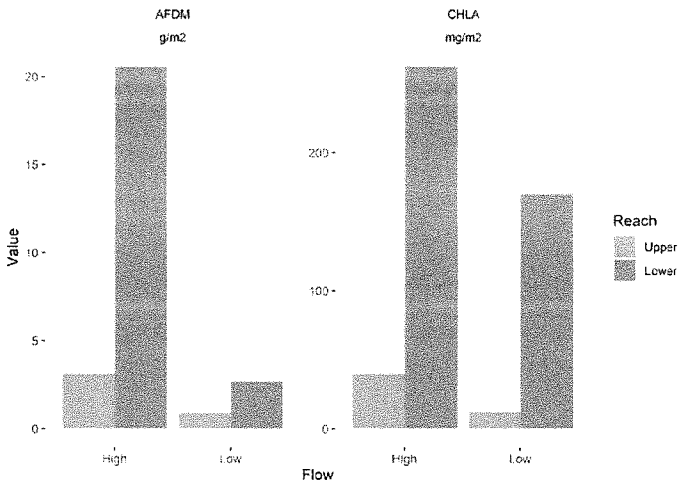
Blanco River: Nitrogen Isotopes in Algae

- d15N in algae is an indicator of SOURCES of nutrients. The higher the value, the more nitrogen is coming from municipal wastewater.
- d15N was markedly higher at Blanco Settlement when compared to the upstream site. Levels of d15N above 10 are highly indicative of wastewater, which was evident from both sampling events at the lower site.



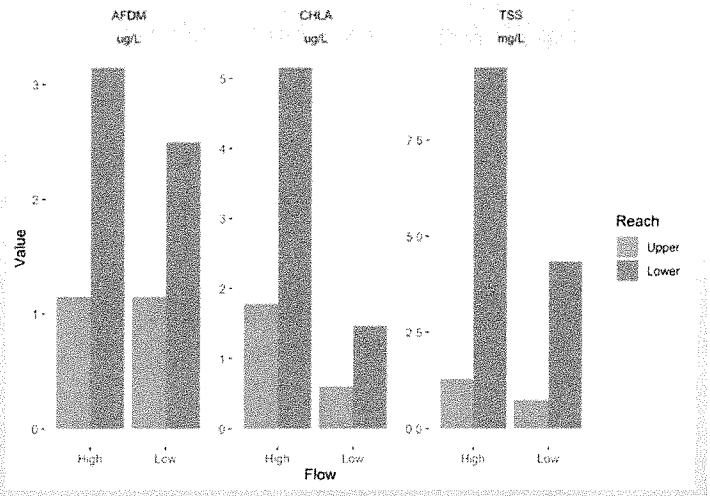
Blanco River: Algae on the Stream Bottom

- Total biomass of organic matter (AFDM) and algae biomass (CHLA) was several times greater at Blanco Settlement than at the upstream reference site **during both seasons.**
- The level of CHLA at Blanco Settlement during exceeded what is widely considered to be a threshold for nuisance levels of algae (150 mg/m2), which was evident from photographs and casual observation as well.



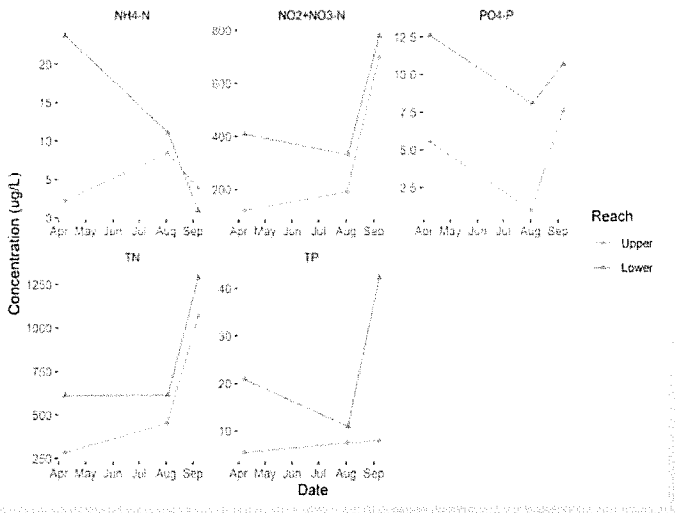
Blanco River: Particles in the Water

- Organic matter (AFDM), algal biomass (CHLA), and all types of particles (TSS) were always higher at the lower reach (Blanco Settlement) than the upper reach (Goldwin-Smith)
- The data suggest most of the cloudiness in the water at Blanco Settlement **was related to algae in the water**



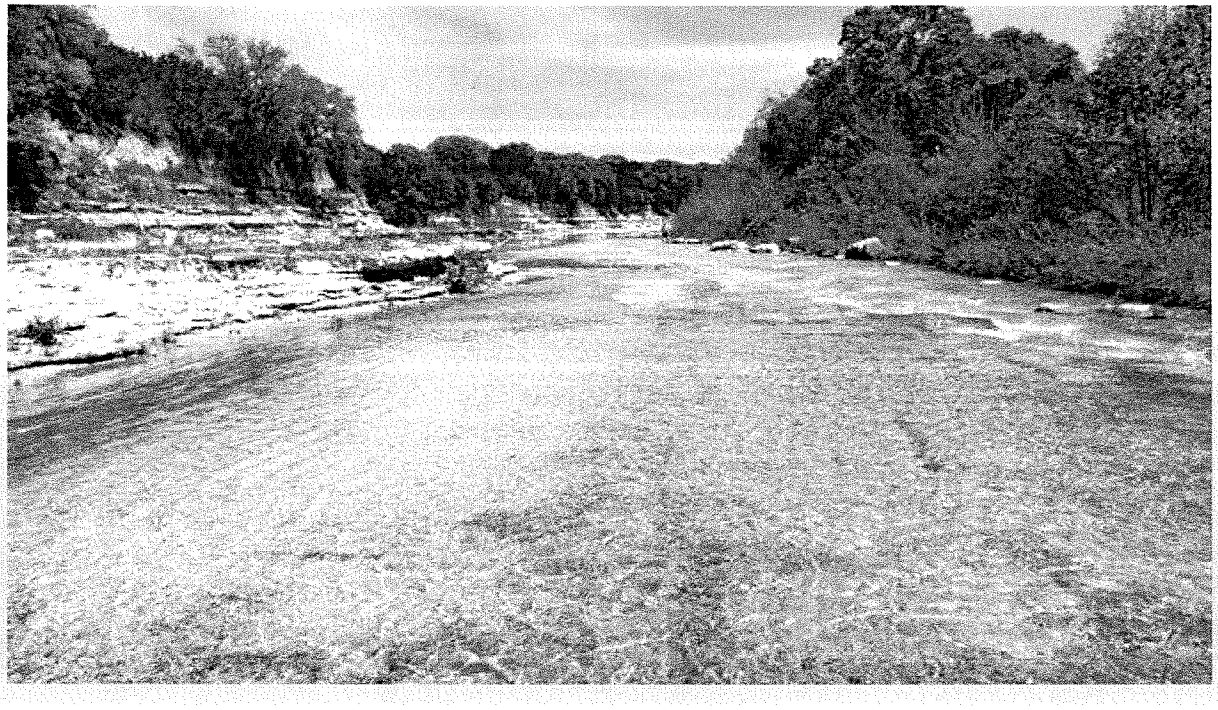
Blanco River: Nutrients

- Total phosphorus (TP) exceeded 20 ug/L April and over 40 ug/L during low flow (Sep) at lower reach
  - Note: These are levels that correspond to nuisance algal blooms in TX and OK/AR studies
- TP was always <10 ug/L at the upper reach
- Other nutrients also trended higher at lower reach



Blanco River at Blanco Settlement, April 2019

Blanco River at Goldwin-Smith Road, April 2019



Blanco River Study

- Two locations:
  - Upstream of City of Blanco, adjacent to Smith property on Goldwin-Smith Road
  - Downstream of 165 @ Blanco Settlement
- Sampling during early summer high flows (April-May) and late summer low flows (August-Sep)

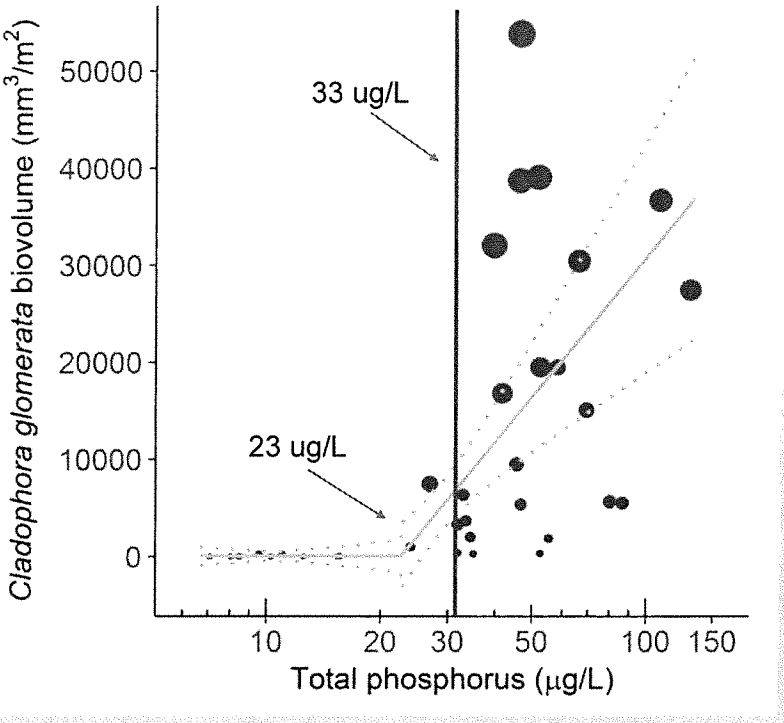
LIVE

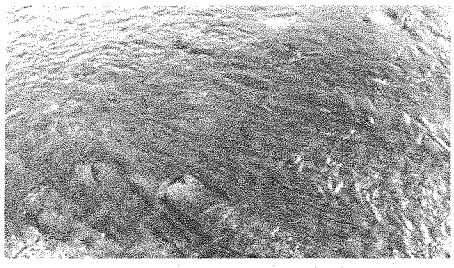
75°
Austin, TX

Algae infestation is causing an upset among residents along the Blanco River

Residents near the Blanco River say the algae problem has gotten a lot worse in only a few week's time.

https://www.kvue.com/video/tech/science/environment/homeowners-concerned-about-algae-in-blanco-river/269-240853a9-276d-4af7-a8b3-3a0fde041950?jwsource=cl



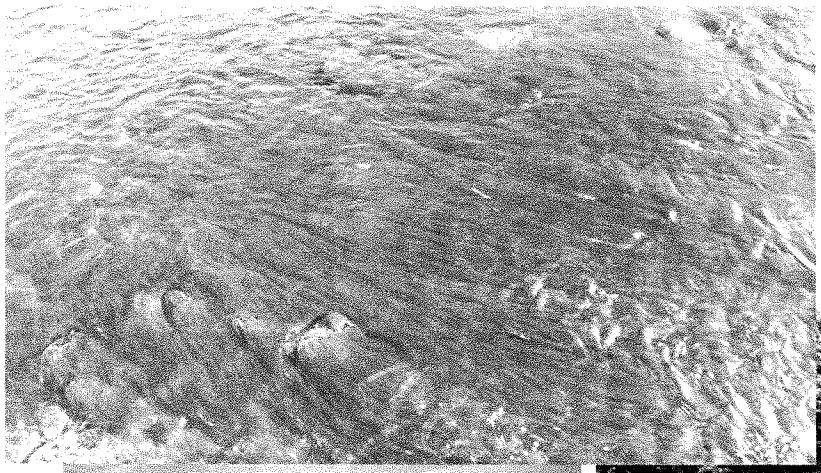


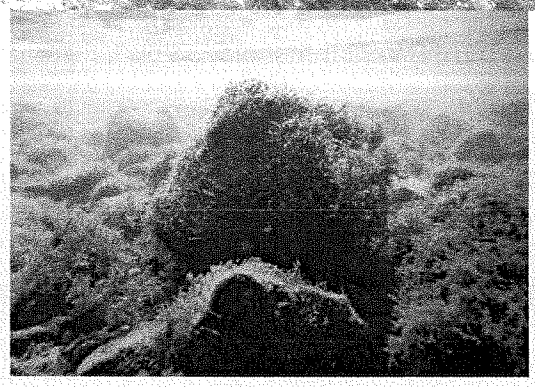
Segmented regression threshold: 23 ug/L

Threshold Indicator Taxa Analysis (TITAN) taxa threshold: 33 ug/L

Bottom line: Nuisance algae proliferated between **20 and 35 ug/L TP**, and was virtually absent below 15 ug/L TP.

This result is very similar to TX studies.



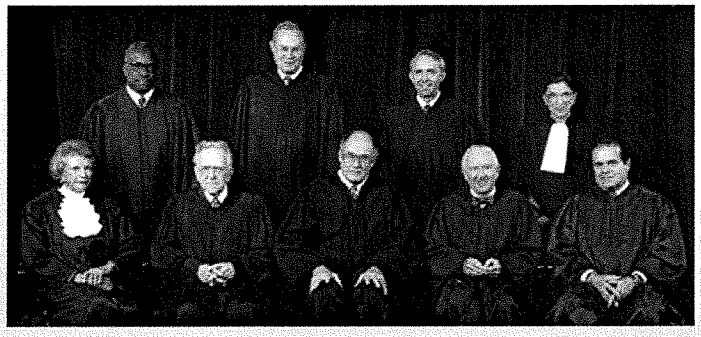


Oklahoma-Arkansas Joint Phosphorus Study focused on “nuisance algae”

Predominantly *Cladophora glomerata*

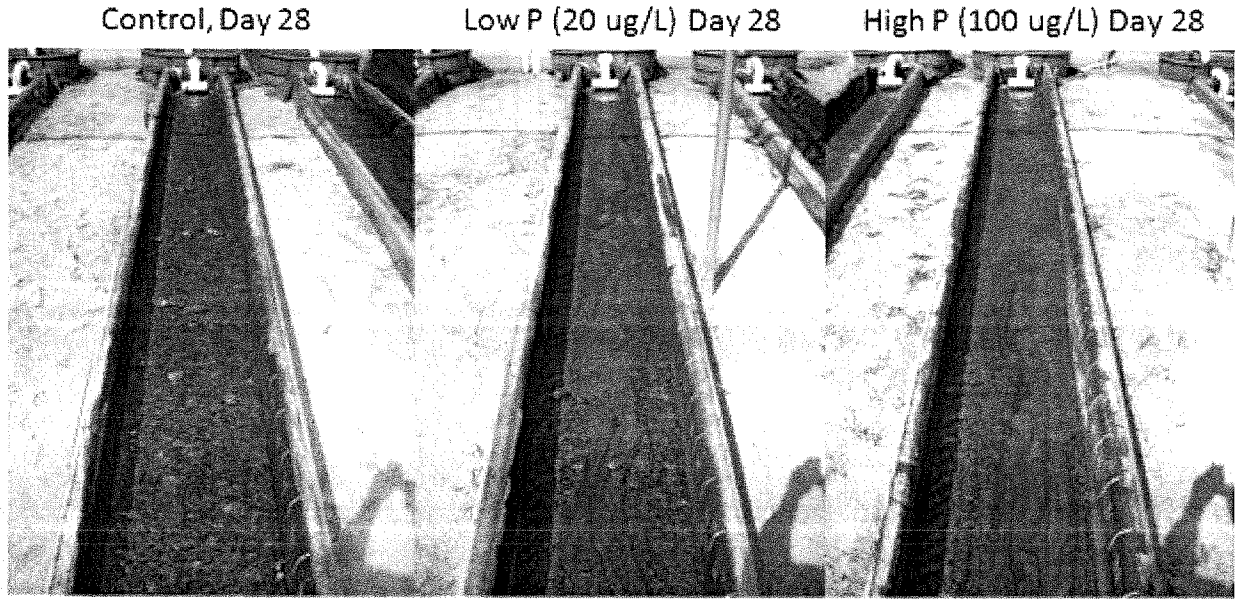
Other nutrient criteria research

- *Oklahoma-Arkansas Scenic Rivers Joint Phosphorus Study*. Final Report to the Governors from the Joint Study Committee and Scientific Professionals.
- Study based on landmark Supreme Court case
- After 30 years of litigation, this study resulted in unanimous support for a numeric P criterion



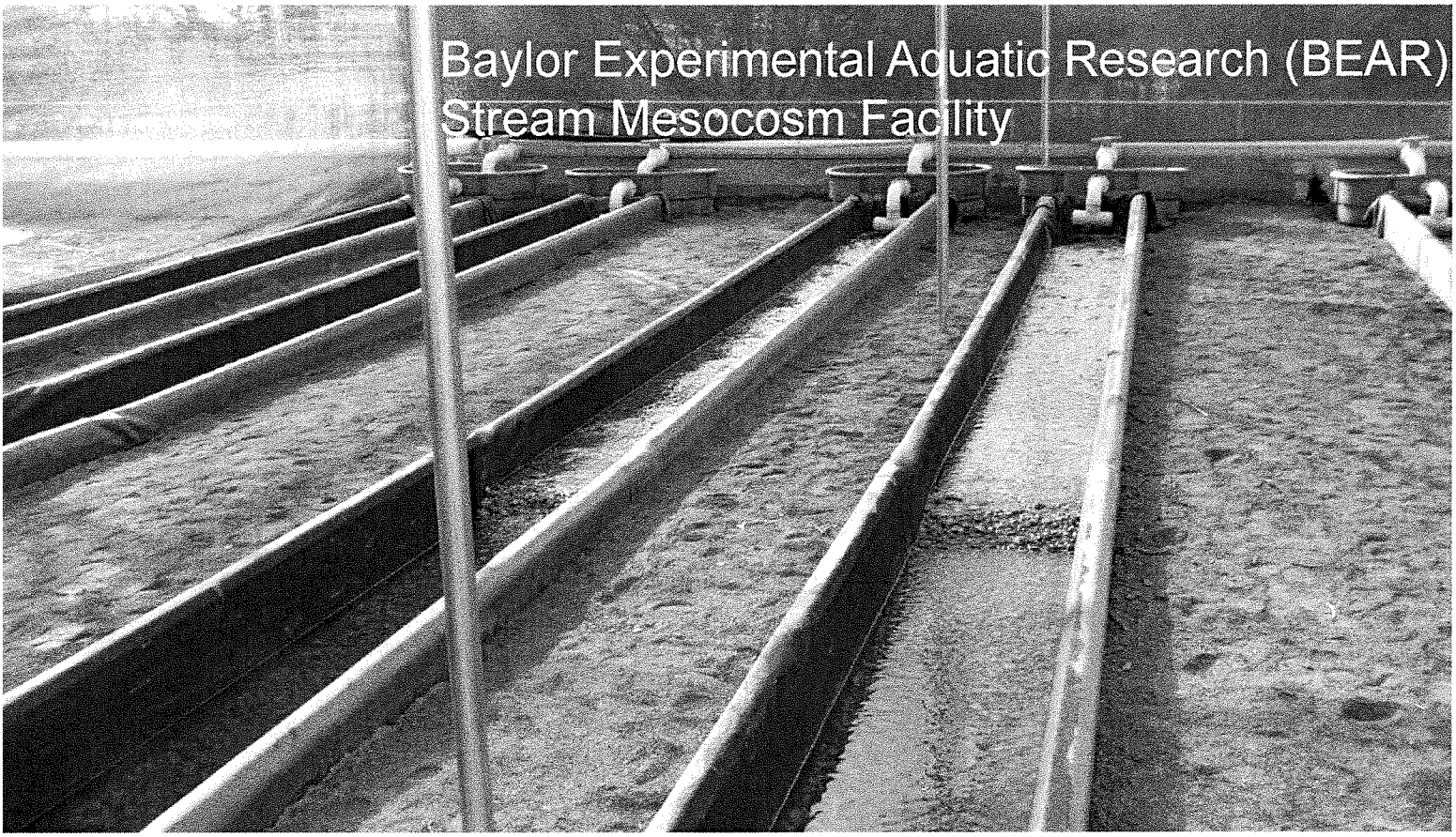
US Supreme Court, 1992

https://www.baylor.edu/aquaticlab/doc.php/302701.pdf



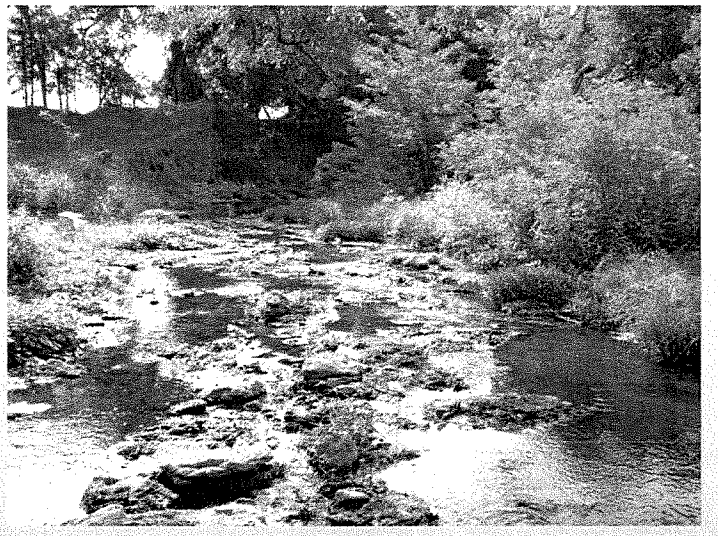
Experiment confirmed that >20 ug/L P caused nuisance algal growth

Cladophora=nuisance green algae


Baylor Experimental Aquatic Research (BEAR)
Stream Mesocosm Facility

Streams > 20 ug/L total phosphorus

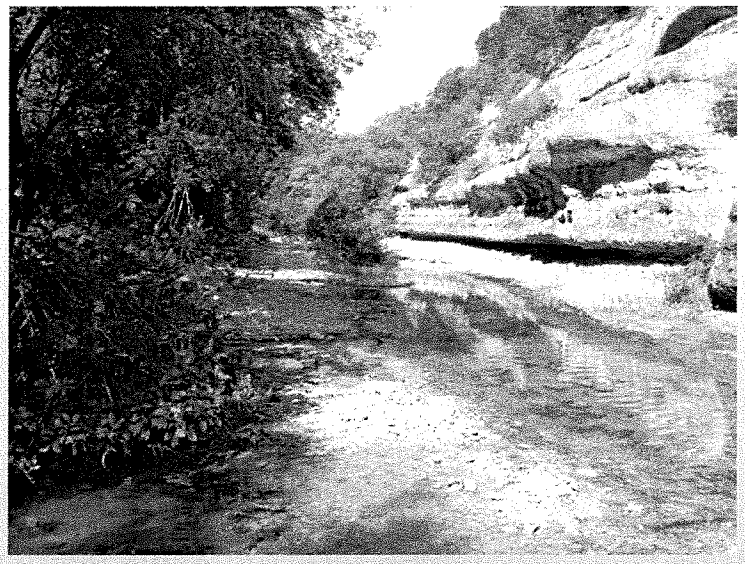
- High levels of nuisance filamentous green algae
- Low dissolved oxygen at night
- Diatom and macroinvertebrate communities typical of overenriched streams
- Fish communities dominated by carp, red shiners



North Bosque River near Stephenville, TX, 2008

Streams < 15 ug/L total phosphorus (TP)

- Very low levels of nuisance filamentous green algae
- High dissolved oxygen
- Exceptional diatom and macroinvertebrate communities
- Exceptional fish communities



Salado Creek upstream of Salado, TX, 2008

Nutrient criteria research in Texas

Linking observational and experimental approaches for development of numerical nutrient criteria for wadeable streams. 2009. Section 104(b)(3) Water Quality Cooperative Agreement #CP-966137-01 **U. S. EPA Region 6**, Dallas, TX.

https://www.baylor.edu/content/services/document.php/95606.pdf

Development of biological indicators of nutrient enrichment for application in Texas streams. 2009. 106 Water Pollution Control Grant # 98665304, **Texas Commission on Environmental Quality**, Austin, TX.

https://www.baylor.edu/content/services/document.php/107739.pdf

Dr. Ryan S. King: Credentials

- PhD, Duke University, 2001
- Ecologist, Smithsonian Institution, 2001-04
- Professor (Full), Biology, Baylor University
- Outstanding Professor Award, Baylor, 2014
- Expert witness in 8 Federal cases involving environmental pollution
- Published ~100 journal articles and reports
- Research focused primarily on nutrient criteria in streams, with several projects in Texas and surrounding states

Baylor University

Nutrient and biological assessment of the Blanco River, 2019

Ryan S. King, Ph.D.

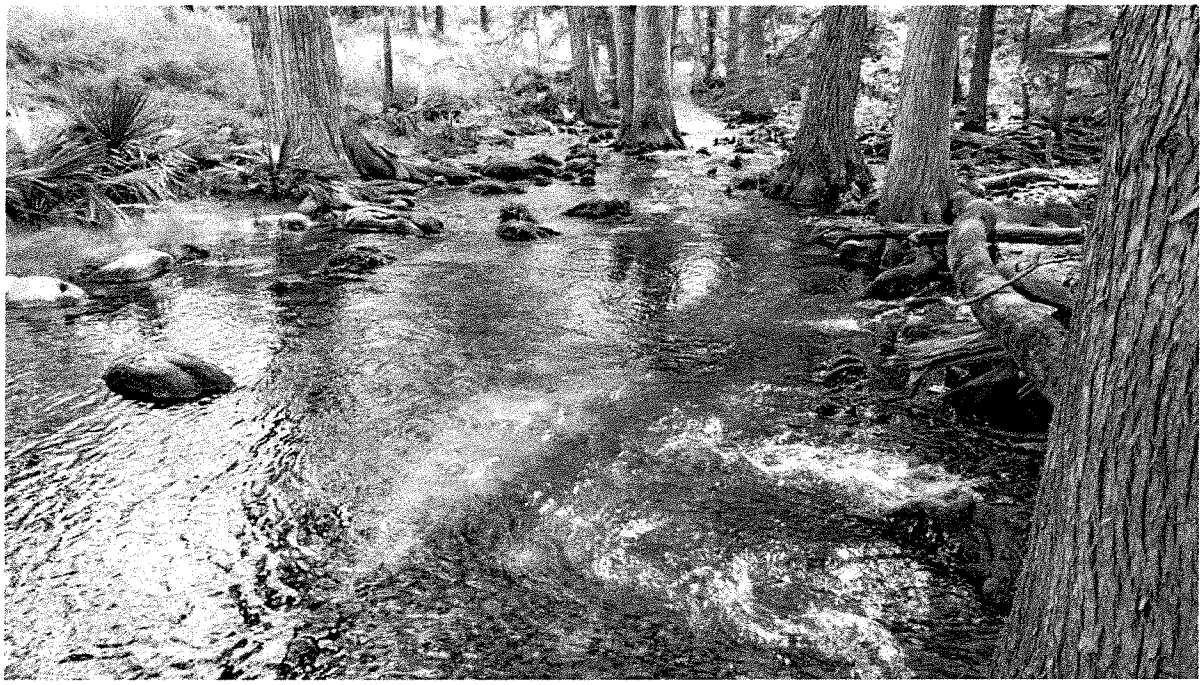
Professor and Graduate Program Director
Department of Biology
Center for Reservoir and Aquatic Systems Research
Baylor University, Waco, TX
www.baylor.edu/aquaticlab

Public comment prepared for Blanco City Council, August 2020

CRASR
Center for Reservoir & Aquatic Systems Research

Barton Creek may have some influence of wastewater from the upstream catchment, as evidenced by slightly elevated nitrogen isotopes in the periphyton, but there were no clear differences between the upstream and downstream reaches as they relate to Long Branch, the tributary proposed to be the conduit for wastewater into Barton Creek on Shield Ranch. Currently, Barton Creek at Shield Ranch has relatively high-water quality and algal, macroinvertebrate, and fish assemblages typical of a reference-caliber Hill-Country stream.

Finally, Honey Creek, arguably the most unique and special of these four streams, had differences between the upstream and downstream reach that were likely mostly related to the amount of groundwater feeding into the stream, with the upper reach being just downstream of the first major spring, and the downstream reach being downstream of one or several more larger springs. The lower reach had much higher flows, but also higher levels of nitrogen, potentially indicative of groundwater contamination. Both reaches had higher-than-expected nitrogen concentrations and are highly vulnerable to any additional nutrient enrichment, especially phosphorus, given the already elevated levels of nitrogen.

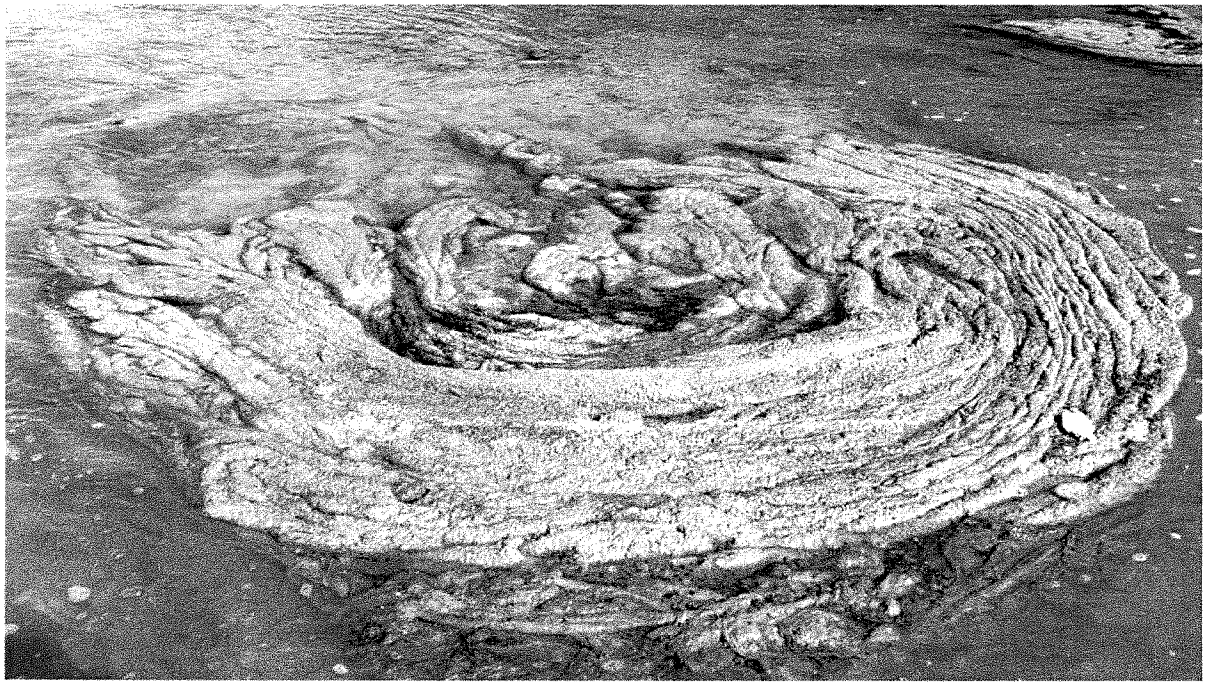


Honey Creek, Lower Reach, May 2019. Green coloration on the stream bottom was predominantly aquatic mosses (bryophytes) and vascular plants (macrophytes), which are indicative of high-water quality.

Conclusions

All four of these Hill Country streams are vulnerable to nutrient enrichment. In the cases of the three streams where the reach upstream was above the input of existing and potential wastewater inputs (all but Honey Creek), these reaches had ambient nutrient levels indicative of a low-nutrient, pristine to nearly pristine Hill Country ecosystem. However, in two of these three cases, the lower reach (Blanco River and Onion Creek) already had signs of wastewater pollution.

The Blanco River at Blanco Settlement, in particular, was already impacted by sources of nutrients that were not detected above the city of Blanco. Multiple indicators (dissolved and total phosphorus concentrations, sestonic chlorophyll-a and total suspended solids, 24-hour changes in dissolved oxygen, algal biomass, stable isotopes of nitrogen in algae, nuisance algal biovolume, diatom species composition, macroinvertebrate densities, macroinvertebrate species composition, and fish species densities) all suggested that the Blanco River at Blanco Settlement was impacted already by wastewater.



Huge mats of Cladophora glomerata, such as shown here, were found throughout the lower reach (Blanco Settlement) of the Blanco River during April 2019.

Onion Creek at CharRo Ranch had fewer indicators of wastewater impacts than Blanco Settlement, but it appears to be in the early stages of eutrophication from excessive nutrient inputs. Nutrients trended higher during certain flow regimes, especially low flow, as did stable nitrogen isotopes, which are one of the most sensitive early-warning signals of external wastewater nutrient sources. Of further concern is the tendency for the lower reach to dry up into a series of pools during low flow, which leaves it even more vulnerable to nutrient enrichment.

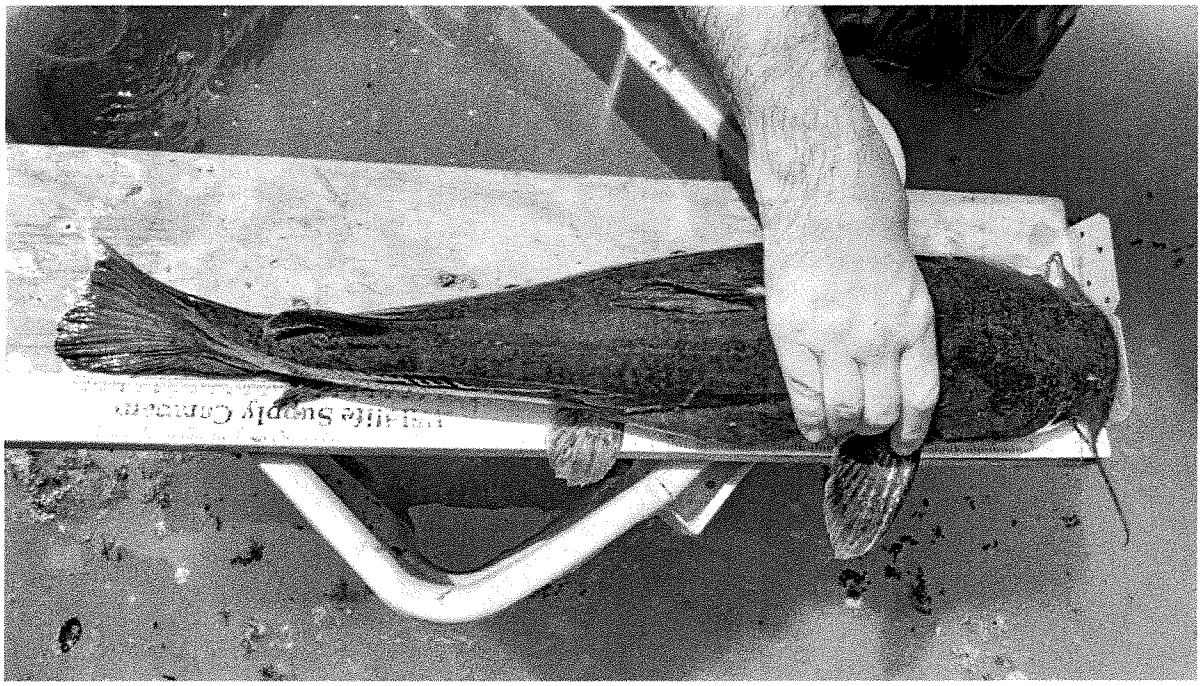


Image Onion.3: Flathead Catfish from Lower reach, upper pool, September 2019.

Image Onion.2. Electrofishing Lower reach, September 2019.

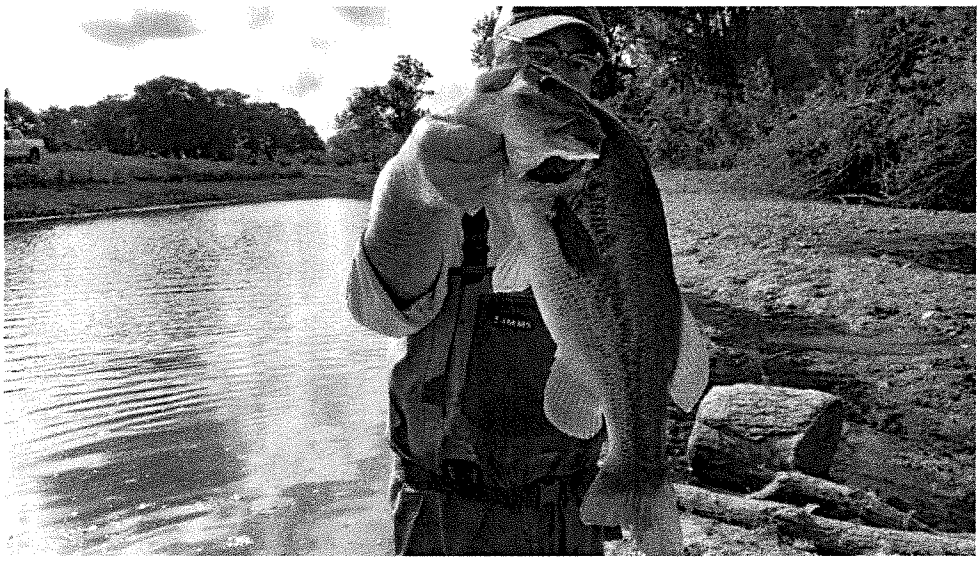


Image Onion.1: Largemouth bass from Onion Creek, Lower reach, September 2019.

Onion Creek: Fish Assemblage Composition

Table Onion.2: Fish assemblages were consistent with high quality Hill Country streams. Both reaches supported Guadalupe Bass, an endemic to central Texas, as well as surprisingly high numbers of good-sized largemouth bass and most of the sunfish species known from the region. One difference was that the lower reach had several very large, adult flathead catfish as well as numerous juveniles of both flathead and channel catfish. Note that column 1 refers to the total number of individuals collected whereas column 2 represents the number of juveniles (as part of the total number).

Onion Creek, Lower		
Blacktail Shiner	65	5
Bluegill	406	57
Bullnose minnnow	1	1
Channel Catfish	20	15
Flathead Catfish	8	1
Green Sunfish	63	20
Largemouth Bass	13	8
Lepomis spp.	386	385
Longear Sunfish	90	5
Redbreast Sunfish	5	0
Redear Sunfish	44	2
Redspotted Sunfish	5	0
Warmouth	4	0
Western Mosquitofish	25	24
Total	**1135**	**523**
Onion Creek, Upper		
Blacktail Shiner	59	0
Bluegill	99	38
Green Sunfish	8	0
Guadalupe Bass	1	1
Largemouth Bass	11	1
Lepomis spp.	3	3
Longear Sunfish	100	3
Redbreast Sunfish	33	0
Redear Sunfish	32	0
Total	**346**	**46**

Macroinvertebrate Taxonomic Composition

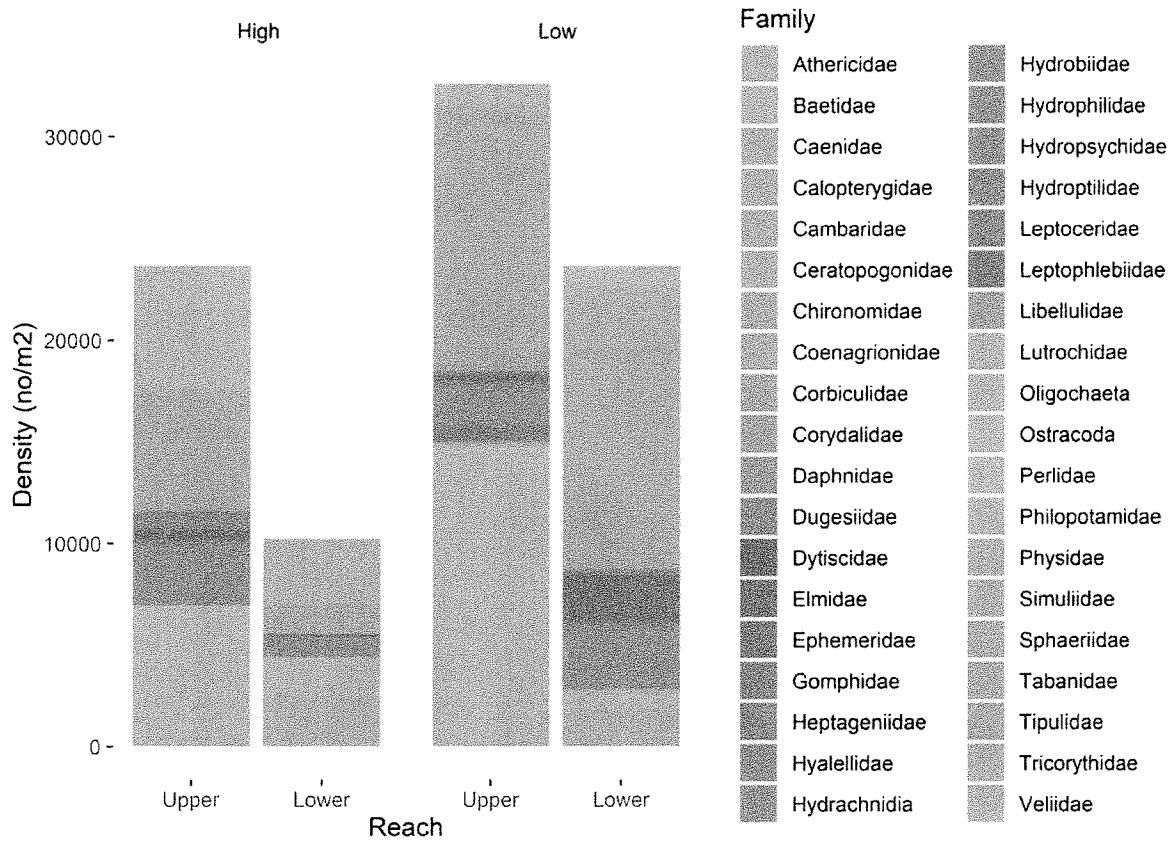


Figure Onion.10. Stacked bar plot of macroinvertebrate densities by family. The upper reach tended to have slightly higher densities, but composition was quite similar between both reaches during early season, high flows and late season, low flows.

Onion Creek: Macroinvertebrate Densities

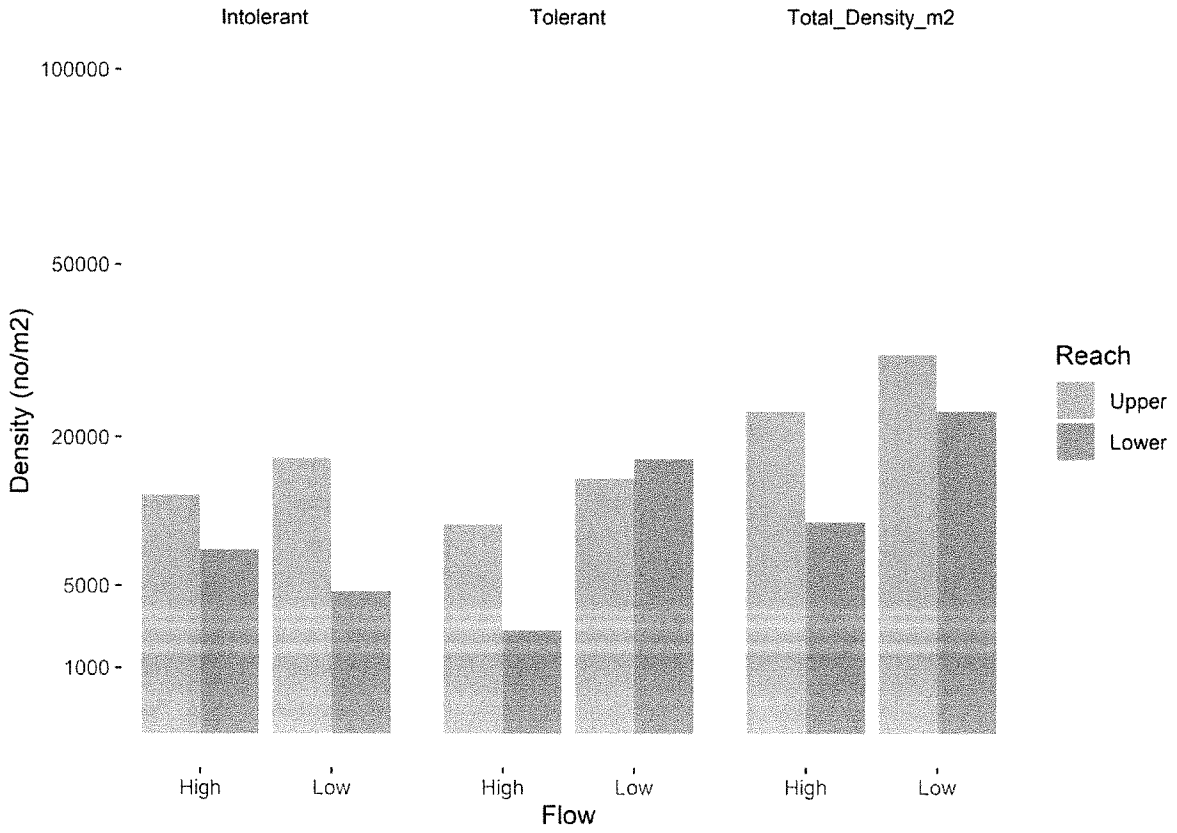


Figure Onion.9: Macroinvertebrate community composition differed slightly between reaches. The Upper reach had higher densities of macroinvertebrates in both seasons, but the species richness was not consistently higher or lower. In April, the upper reach had more taxa than the lower, but August low flow, the lower reach had more taxa.

LOW FLOW, Upper (Mt. Gainor)

Metric	Value	Score	4	3	2	1
Taxa Richness	32	4	>21	15-21	8-14	<8
# EPT	11	4	>9	7-9	4-6	<4
HBI	4.05	3	<3.77	3.77-4.52	4.53-5.27	>5.27
% Chironomidae	28.81	1	0.79-4.10	4.11-9.48	9.49-16.19	<0.79 or >16.19
% Most Dominant Taxa (*Chimarra*)	43.68	1	<22.15	22.15-31.01	31.02-39.88	>39.88
% Most Dominant FFG (FC)	54.82	1	<36.50	36.50-45.30	45.31-54.12	>54.12
% Predators	23.39	3	4.72-15.20	15.21-25.67	25.68-36.14	<4.73 or >36.14
Ratio Intolerant (<6) /Tolerant (≥6)	1.17	1	>4.79	3.21-4.79	1.63-3.20	<1.63
% Trichoptera as Hydropsychidae	6.43	4	<25.50	25.51-50.50	50.51-75.50	>75.50 or none
# Non-insect Taxa	6	4	>5	4-5	2-3	<2
% Collector-Gatherers	16.43	4	8.00-19.23	19.24-30.46	30.47-41.68	<8.00 or >41.68
% Elmidae	0.92	4	0.88-10.04	10.05-20.08	20.09-30.12	<0.88 or >30.12
Aquatic Life Use Designation	HIGH	34				
Exceptional	>36					
High	29-36					
Intermediate	22-28					
Low	<22					

Low Flow, Lower (CharRo)

Metric	Value	Score	4	3	2	1
Taxa Richness	41	4	>21	15-21	8-14	<8
# EPT	11	4	>9	7-9	4-6	<4
HBI	5.06	2	<3.77	3.77-4.52	4.53-5.27	>5.27
% Chironomidae	43.91	1	0.79-4.10	4.11-9.48	9.49-16.19	<0.79 or >16.19
% Most Dominant Taxa (Chironominae)	37.58	2	<22.15	22.15-31.01	31.02-39.88	>39.88
% Most Dominant FFG ()	32.67	4	<36.50	36.50-45.30	45.31-54.12	>54.12
% Predators	19.90	3	4.72-15.20	15.21-25.67	25.68-36.14	<4.73 or >36.14
Ratio Intolerant (<6) /Tolerant (≥6)	0.27	1	>4.79	3.21-4.79	1.63-3.20	<1.63
% Trichoptera as Hydropsychidae	81.43	1	<25.50	25.51-50.50	50.51-75.50	>75.50 or none
# Non-insect Taxa	8	4	>5	4-5	2-3	<2
% Collector-Gatherers	32.67	2	8.00-19.23	19.24-30.46	30.47-41.68	<8.00 or >41.68
% Elmidae	9.43	4	0.88-10.04	10.05-20.08	20.09-30.12	<0.88 or >30.12
Aquatic Life Use Designation	HIGH	32				
Exceptional	>36					
High	29-36					
Intermediate	22-28					
Low	<22					

Onion Creek: Macroinvertebrates Community Metrics and ALU Designation

Table Onion.1: The TCEQ Multimetric Index scored only a "High" Aquatic Life Use Designation in the Lower reach during low flow compared to an "Exceptional" in the Upper reach. Both reaches were classified as "Exceptional" during the high flow period in April.

HIGH FLOW, Upper (Mt. Gainor)

Metric	Value	Score	4	3	2	1
Taxa Richness	**31**	4	>21	15-21	8-14	<8
# EPT	**10**	4	>9	7-9	4-6	<4
HBI	**4.44**	3	<3.77	3.77-4.52	4.53-5.27	>5.27
% Chironomidae	**21.53**	1	0.79-4.10	4.11-9.48	9.49-16.19	<0.79 or >16.19
% Most Dominant Taxa (*Baetis*)	**25.19**	3	<22.15	22.15-31.01	31.02-39.88	>39.88
% Most Dominant FFG (CG)	**23.48**	4	<36.50	36.50-45.30	45.31-54.12	>54.12
% Predators	**18.70**	3	4.72-15.20	15.21-25.67	25.68-36.14	<4.73 or >36.14
Ratio Intolerant (<6) /Tolerant (≥6)	**1.30**	1	>4.79	3.21-4.79	1.63-3.20	<1.63
% Trichoptera as Hydropsychidae	**28.97**	3	<25.50	25.51-50.50	50.51-75.50	>75.50 or none
# Non-insect Taxa	**9**	4	>5	4-5	2-3	<2
% Collector-Gatherers	**23.48**	3	8.00-19.23	19.24-30.46	30.47-41.68	<8.00 or >41.68
% Elmidae	**1.97**	4	0.88-10.04	10.05-20.08	20.09-30.12	<0.88 or >30.12
Aquatic Life Use Designation	EXCEPTIONAL	37				
Exceptional	>36					
High	29-36					
Intermediate	22-28					
Low	<22					

High Flow, Lower (CharRo)

Metric	Value	Score	4	3	2	1
Taxa Richness	**23**	4	>21	15-21	8-14	<8
# EPT	**8**	3	>9	7-9	4-6	<4
HBI	**4.09**	3	<3.77	3.77-4.52	4.53-5.27	>5.27
% Chironomidae	**13.46**	2	0.79-4.10	4.11-9.48	9.49-16.19	<0.79 or >16.19
% Most Dominant Taxa (*Baetis*)	**25.95**	3	<22.15	22.15-31.01	31.02-39.88	>39.88
% Most Dominant FFG (FC)	**49.03**	2	<36.50	36.50-45.30	45.31-54.12	>54.12
% Predators	**14.77**	4	4.72-15.20	15.21-25.67	25.68-36.14	<4.73 or >36.14
Ratio Intolerant (<6) /Tolerant (≥6)	**3.14**	2	>4.79	3.21-4.79	1.63-3.20	<1.63
% Trichoptera as Hydropsychidae	**20.00**	4	<25.50	25.51-50.50	50.51-75.50	>75.50 or none
# Non-insect Taxa	**4**	3	>5	4-5	2-3	<2
% Collector-Gatherers	**19.31**	3	8.00-19.23	19.24-30.46	30.47-41.68	<8.00 or >41.68
% Elmidae	**0.98**	4	0.88-10.04	10.05-20.08	20.09-30.12	<0.88 or >30.12
Aquatic Life Use Designation	EXCEPTIONAL	37				
Exceptional	>36					
High	29-36					
Intermediate	22-28					
Low	<22					

Onion Creek: Diatom Species Community Metrics

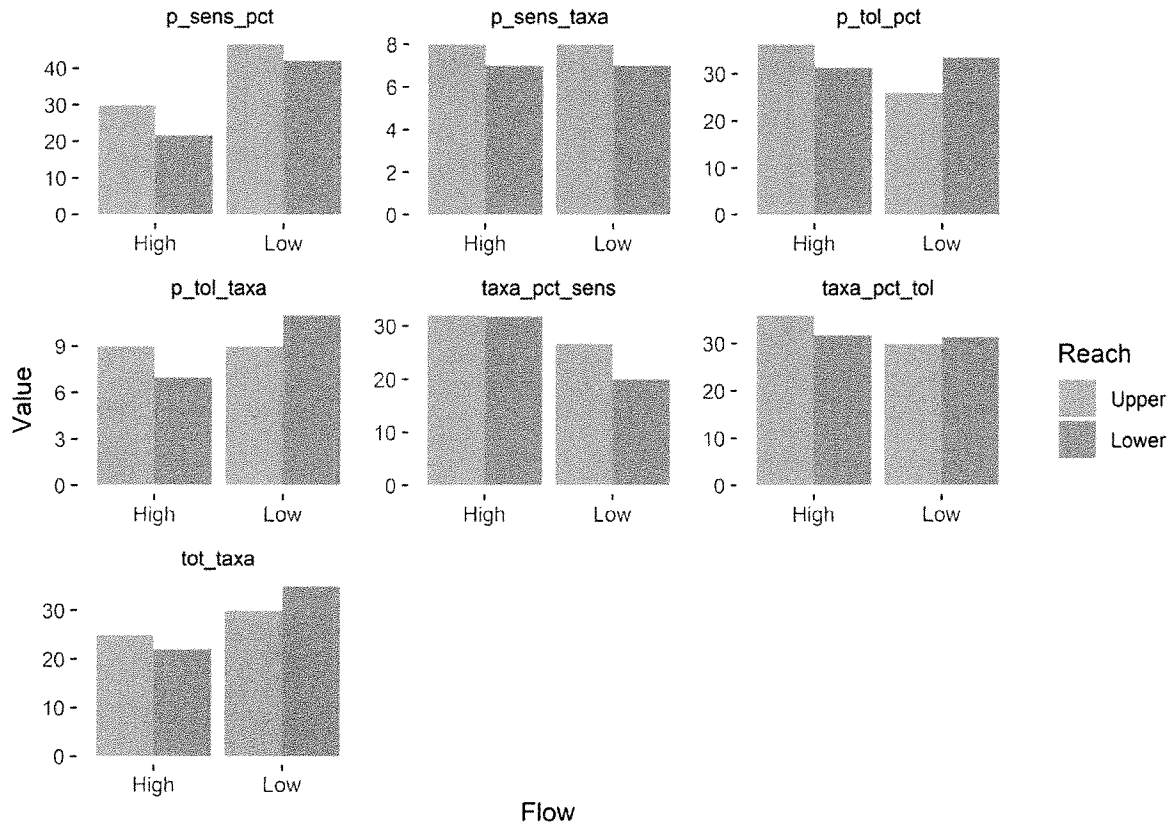


Figure Onion.8: Diatom species richness was similar between both reaches (20-25 species in April, 30-35 species in August). Phosphorus (P) sensitive taxa richness and abundance was similar between reaches, as was the richness of P tolerant taxa. There was no compelling difference in the abundance of any species indicative of high P levels between the two reaches.

Onion Creek: *Cladophora glomerata* (Nuisance Filamentous Green Alga) and Total Soft Algal Biovolume

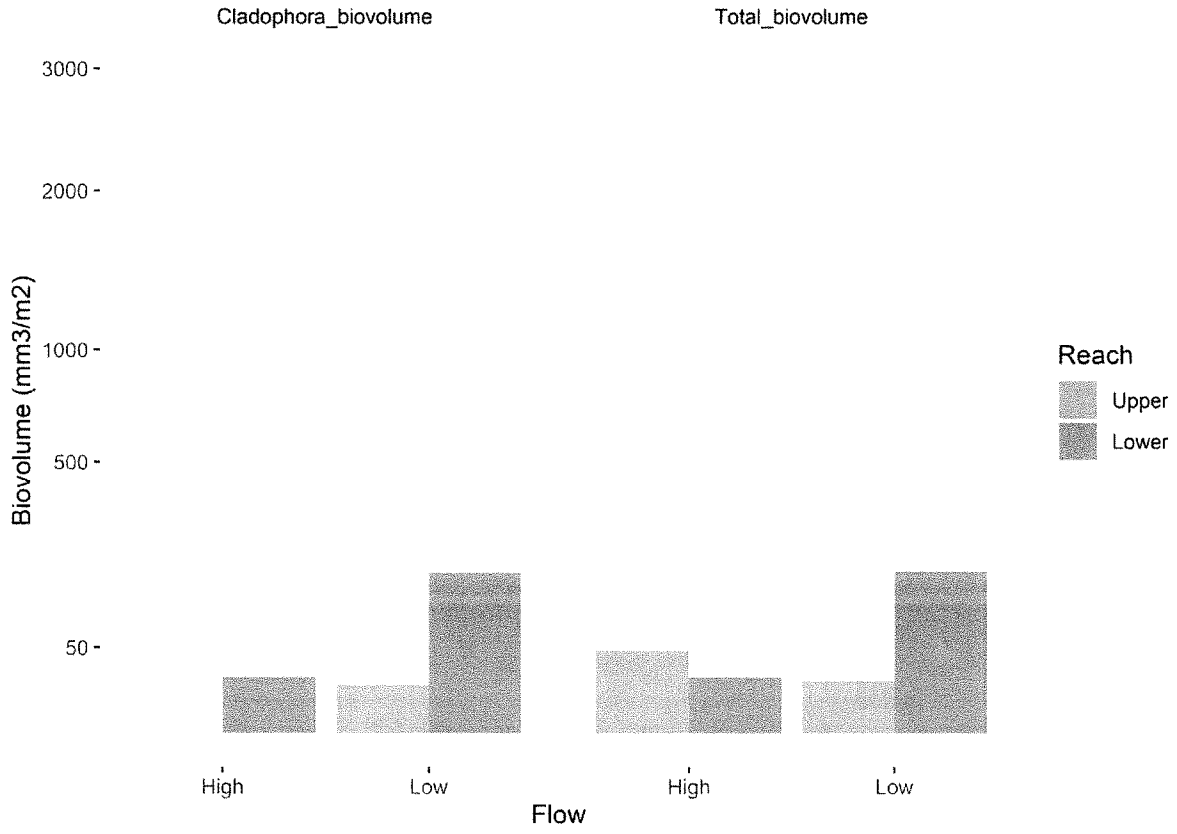


Figure Onion.7: Biomass of Cladophora glomerata, the most common nuisance filamentous green algal species associated with excessive nutrient enrichment, was relatively low in both reaches.

Onion Creek: Periphyton Stable Isotopic Ratios for Carbon and Nitrogen

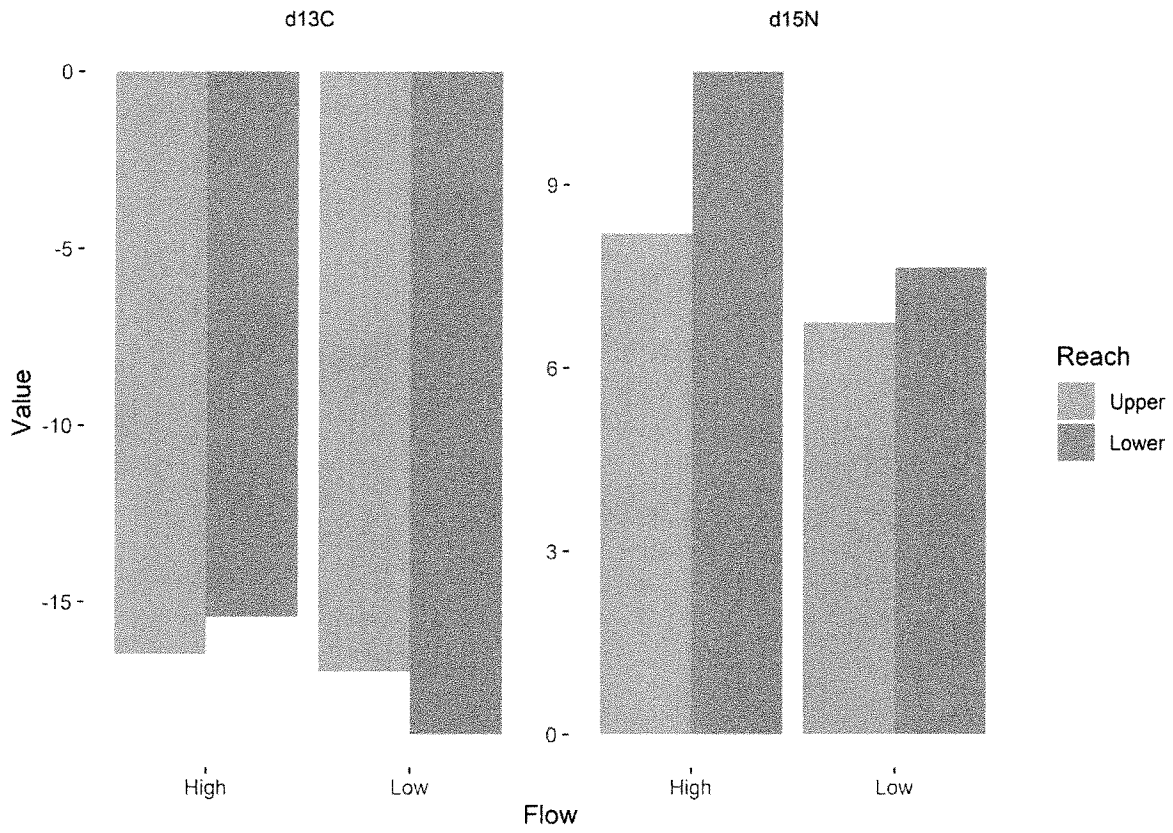


Figure Onion.6: Periphyton stable isotopic ratio values for nitrogen (δ15N) were one of the only variables that definitely suggested a human source of nutrients in the lower reach (CharRo Ranch) when compared to the upper reach. The lower reach had δ15N values near 11 per mil during high flow (April), whereas the upper reach had values closer to 8. The difference between reaches was smaller during the low flow period, which implies that the lack of runoff into the lower reach may have contributed to the increased similarity between the two reaches. That is, if wastewater application to fields or other land was reaching Onion Creek, we might expect this to be more evident during higher flow events when rain would facilitate runoff and increase seepage from uplands near the river.

Onion Creek: Periphyton (Benthic Algae) Biomass

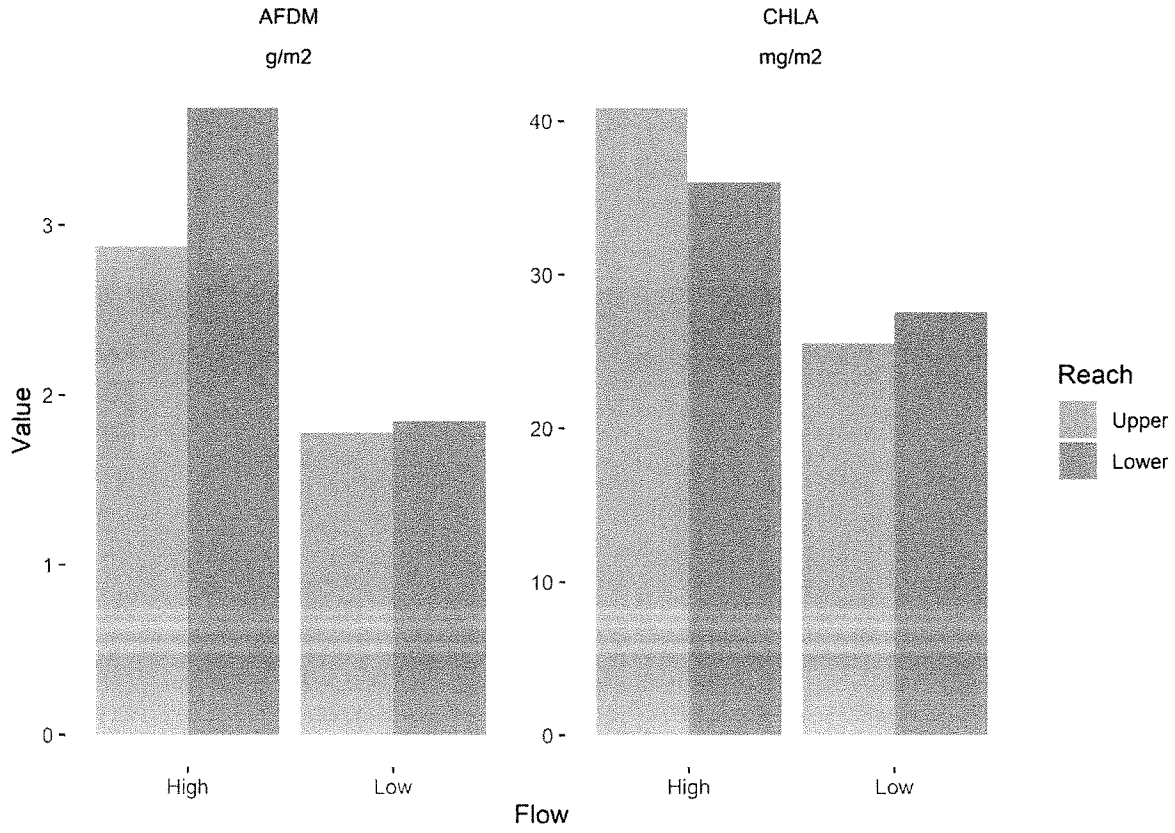


Figure Onion.5: Periphyton (benthic algae) biomass was low and consistent with a low-nutrient ecosystem. Total biomass (ash-free dry mass) and chlorophyll-a were higher in the upper reach during high flow, but values were still quite low in both reaches. Maximum benthic chlorophyll-a was approximately 40 mg/m^2.

Onion Creek: Seston (Organic Matter, Phytoplankton, and Total Particulates in Water Column)

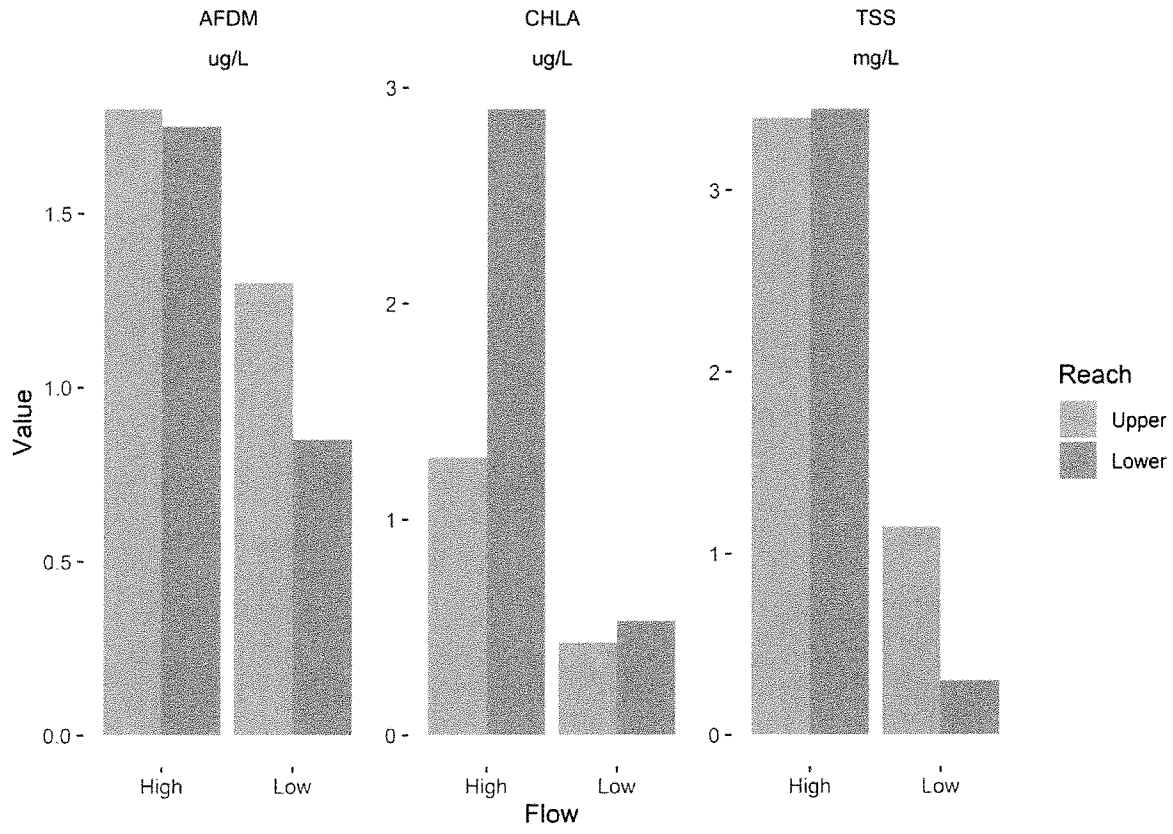


Figure Onion.4. Sestonic organic matter (ash-free dry mass particulates floating in water column), chlorophyll-a (phytoplankton or other algae floating in water column), and total suspended solids (TSS, all particulates in water column) were consistent with high-quality, reference stream conditions in both reaches during both high and low flow events. Sestonic chlorophyll-a peaked in high flows at ~ 3 µg/L in the lower reach and was < 1 µg/L during low-flow conditions.

Onion Creek: EXO1 24 h (Diel) Water Quality Parameters

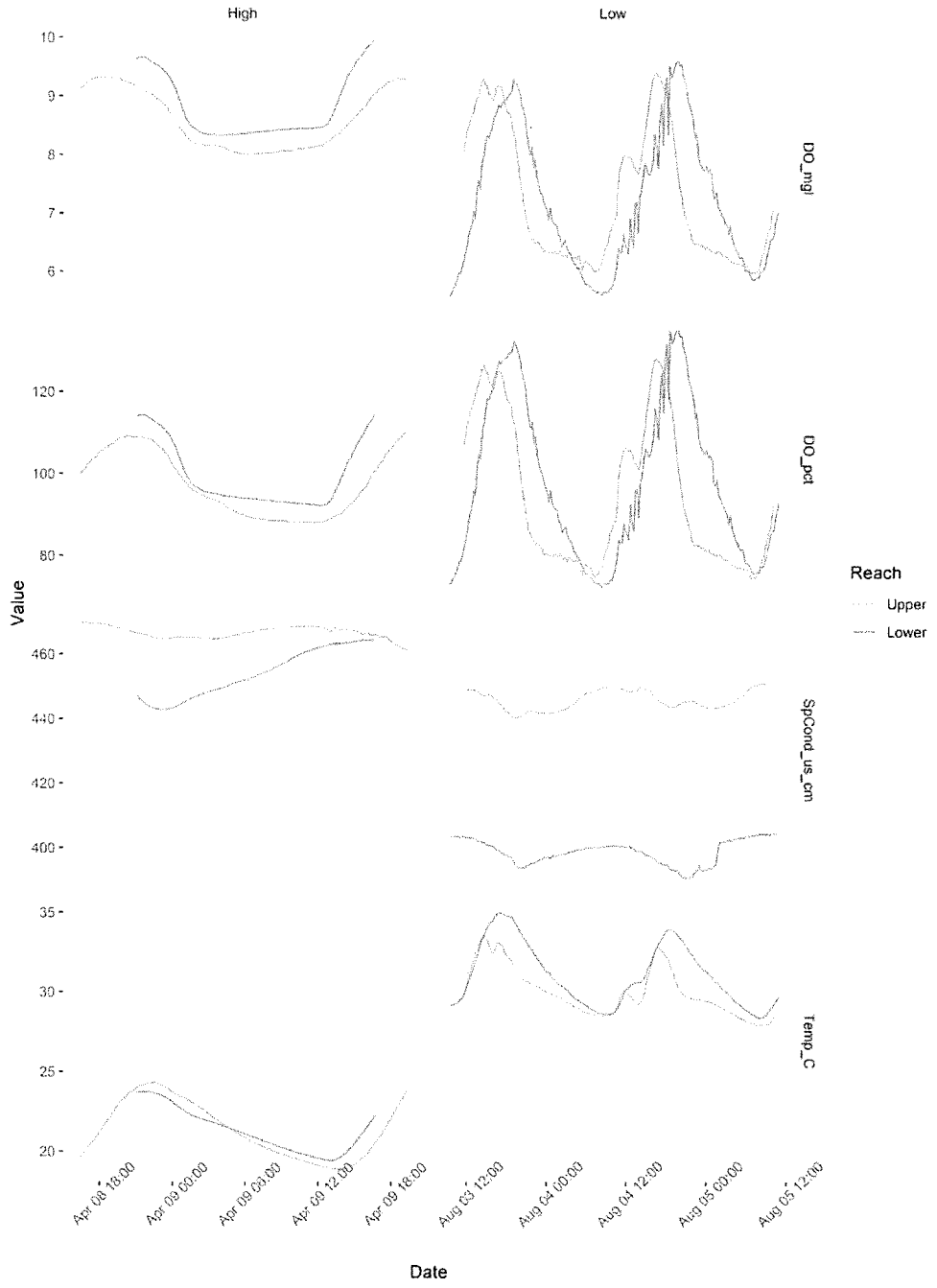


Figure Onion.3: Dissolved oxygen levels were high and remained at or above levels that are supportive of natural biological communities in Texas streams. EXO1 sondes, which were deployed to capture 15-minute intervals of dissolved oxygen and other parameters, revealed similar DO levels between the two reaches during the day and night. Even during low flow, when the lower reach had been reduced to a series of disconnected pools, it maintained DO levels similar to that of the upper, flowing reach.

Onion Creek: YSI EXO1 Data Sonde Parameters, Instantaneous

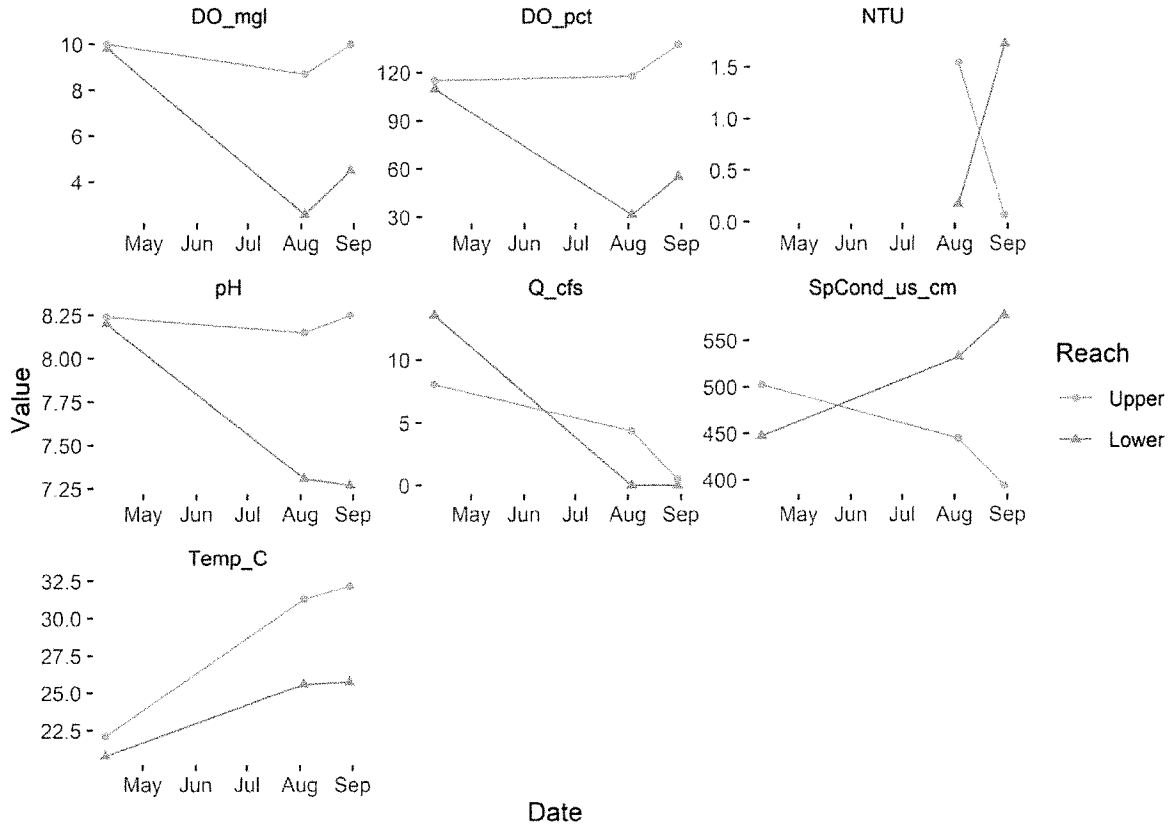


Figure Onion.2: Dissolved oxygen (DO; units are milligrams per liter (mgl) and percent saturation (pct)), turbidity (NTU, a measure of water clarity), pH (acidity), stream flow (Q_cfs, or cubic-feet per second), specific conductance (SpCond_us_cm; units are microsiemens per centimeter), and water temperature (degrees Celsius) measured in the early morning (Lower) and mid-morning (Upper) reaches of Honey Creek during summer 2019. The tendency for the Upper reach to have warmer temperatures and DO is related to daytime (see next for 24-h estimates which account for time of day). NTU levels at both reaches were extremely low. NTU was not measured in May. The two reaches were overall quite similar, although the trend in differences in specific conductance over time may suggest greater influence of groundwater in one of the reaches (lower, probably).

Onion Creek: Nutrients

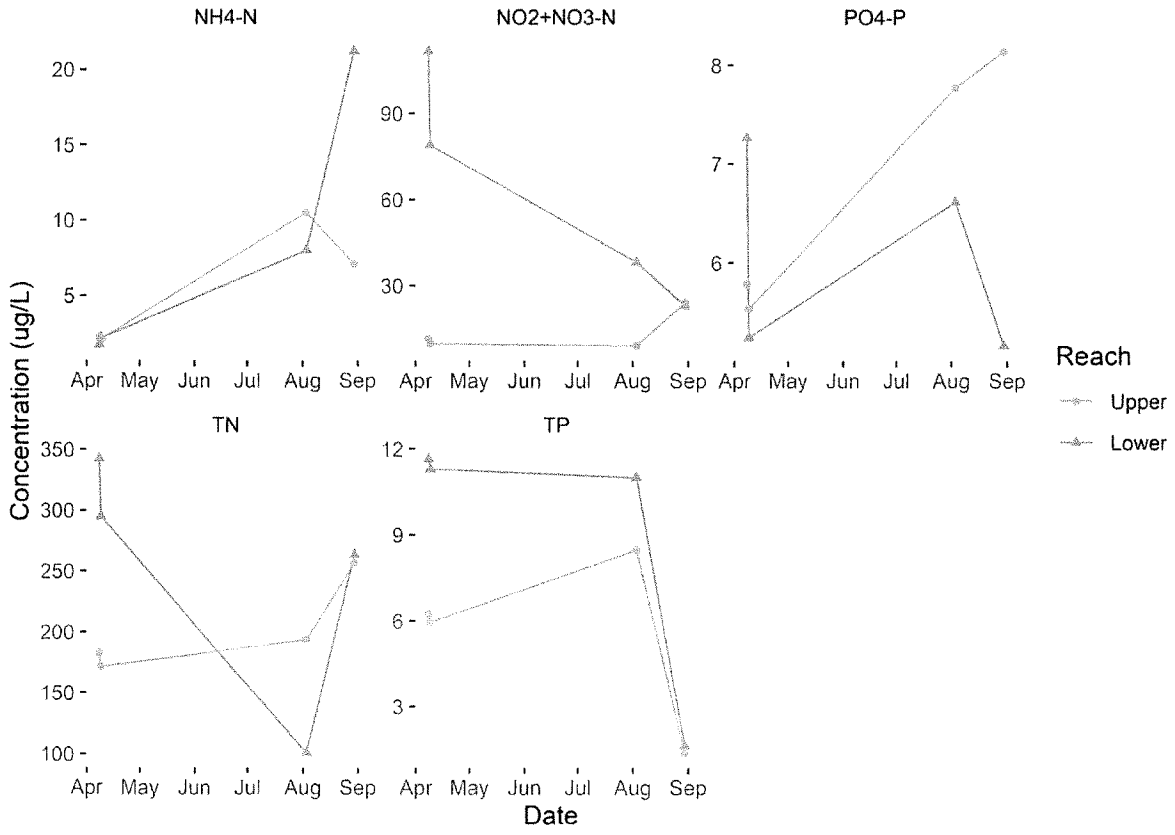


Figure Onion.1: Nutrient levels in both reaches were generally consistent with a high-quality, reference stream in the Edwards Plateau or Cross Timbers Ecoregions of central Texas. However, total P was slightly above 10 µg/L and TN was slightly above 300 µg/L in April 2019 in the lower reach. However, overall, nutrient levels never exceeded levels associated with biological thresholds (e.g., 20 µg/L TP, 500 µg/LTN) for biological condition in central Texas streams.

Diatom species richness was similar between both reaches (20-25 species in April, 30-35 species in August). Phosphorus (P) sensitive taxa richness and abundance was similar between reaches, as was the richness of P tolerant taxa. There was no compelling difference in the abundance of any species indicative of high P levels between the two reaches.

Macroinvertebrate community composition differed slightly between reaches. The Upper reach had higher densities of macroinvertebrates in both seasons, but the species richness was not consistently higher or lower. In April, the upper reach had more taxa than the lower, but August low flow, the lower reach had more taxa. Despite the apparent increase in richness in the Lower reach during low flow, the TCEQ Multimetric Index scored only a "High" Aquatic Life Use Designation based on macroinvertebrate communities compared to an "Exceptional" in the Upper reach. Both reaches were classified as "Exceptional" during the high flow period in April.

Fish assemblages were consistent with high quality Hill Country streams. Both reaches supported Guadalupe Bass, an endemic to central Texas, as well as surprisingly high numbers of good-sized largemouth bass and most of the sunfish species known from the region. One difference was that the lower reach had several very large, adult flathead catfish as well as numerous juveniles of both flathead and channel catfish.

Results

ONION CREEK

Summary

Onion Creek Upper and Lower Reaches were generally similar in physical, chemical, and biological characteristics during both high (April-May) flow but were more dissimilar during low (August) flow sampling events. The lower reach, on CharRo Ranch, spans a groundwater recharge zone and loses most of its flow during low flow periods. Thus, the lower reach became fragmented into a series of disconnected pools during low flow events, whereas the upper reach maintained at least some flow during early and late August 2019.

Nutrient levels in both reaches were generally consistent with a high-quality, reference stream in the Edwards Plateau or Cross Timbers Ecoregions of central Texas. However, total P was slightly above 10 µg/L and TN was slightly above 300 µg/L in April 2019 in the lower reach. However, overall, nutrient levels never exceeded levels associated with biological thresholds (e.g., 20 µg/L TP, 500 µg/LTN) for biological condition in central Texas streams.

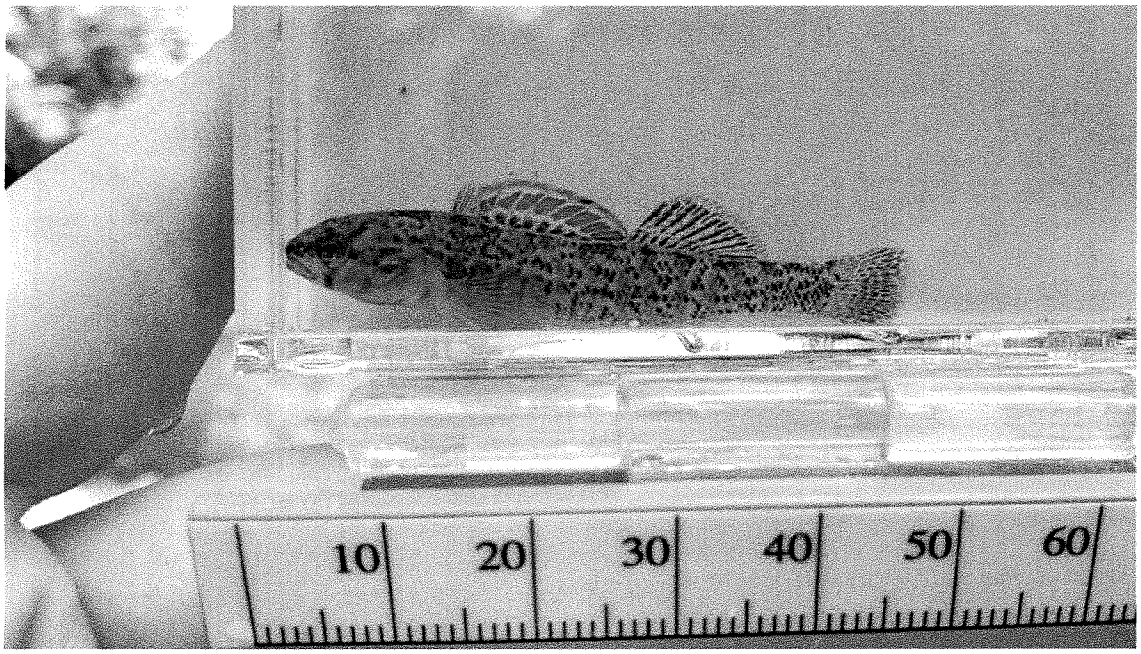
Dissolved oxygen levels were high and remained at or above levels that are supportive of natural biological communities in Texas streams. EXO1 sondes, which were deployed to capture 15-minute intervals of dissolved oxygen and other parameters, revealed similar DO levels between the two reaches during the day and night. Even during low flow, when the lower reach had been reduced to a series of disconnected pools, it maintained DO levels similar to that of the upper, flowing reach.

Sestonic organic matter (ash-free dry mass particulates), chlorophyll-a (phytoplankton), and total suspended solids were consistent with high-quality, reference stream conditions in both reaches during both high and low flow events. Sestonic chlorophyll-a peaked in high flows at ~ 3 µg/L in the lower reach and was < 1 µg/L during low-flow conditions.

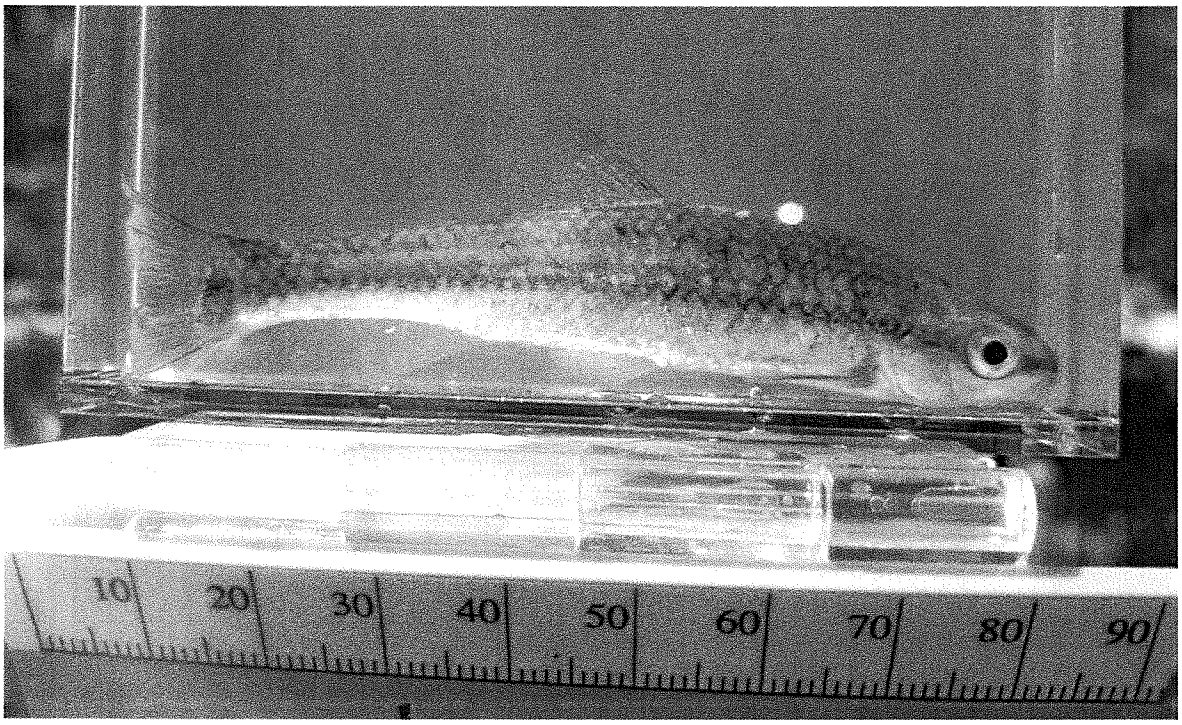
Periphyton (benthic algae) biomass was also quite low and consistent with a low-nutrient ecosystem. Total biomass (ash-free dry mass) and chlorophyll-a were higher in the upper reach during high flow, but values were still quite low in both reaches. Maximum benthic chlorophyll-a was approximately 40 mg/m2.

Periphyton stable isotopic ratio values for nitrogen (δ15N) were one of the only variables that definitely suggested a human source of nutrients in the lower reach (CharRo Ranch) when compared to the upper reach. The lower reach had δ15N values near 11 per mil during high flow (April), whereas the upper reach had values closer to 8. The difference between reaches was smaller during the low flow period, which implies that the lack of runoff into the lower reach may have contributed to the increased similarity between the two reaches. That is, if wastewater application to fields or other land was reaching Onion Creek, we might expect this to be more evident during higher flow events when rain would facilitate runoff and increase seepage from uplands near the river.

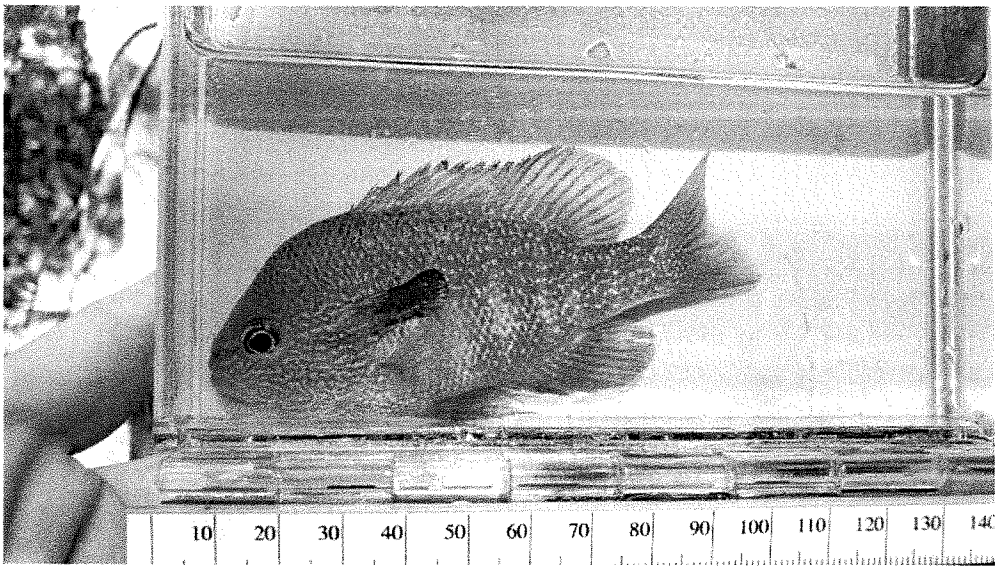
Biomass of *Cladophora glomerata*, the most common nuisance filamentous green algal species associated with excessive nutrient enrichment, was relatively low in both reaches.



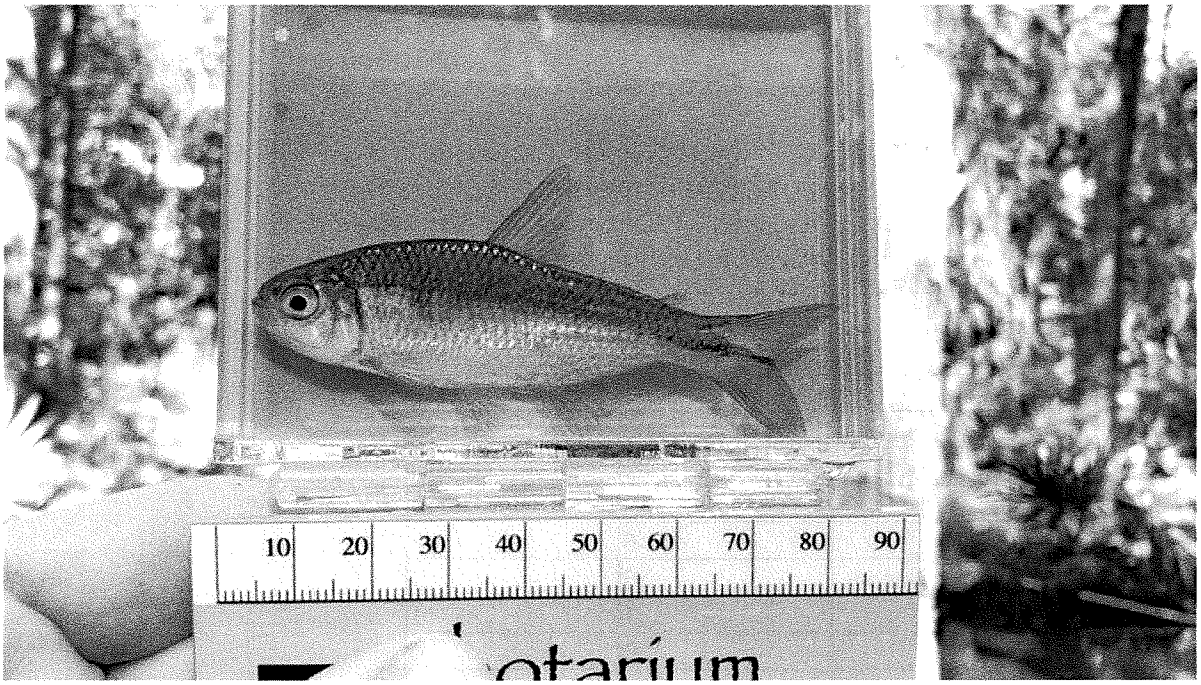
Greenthroat darter (*Etheostoma lepidum*) from Honey Creek in September 2019, a species only found in spring-fed streams in the Colorado, Guadalupe, and Nueces drainages of Texas.



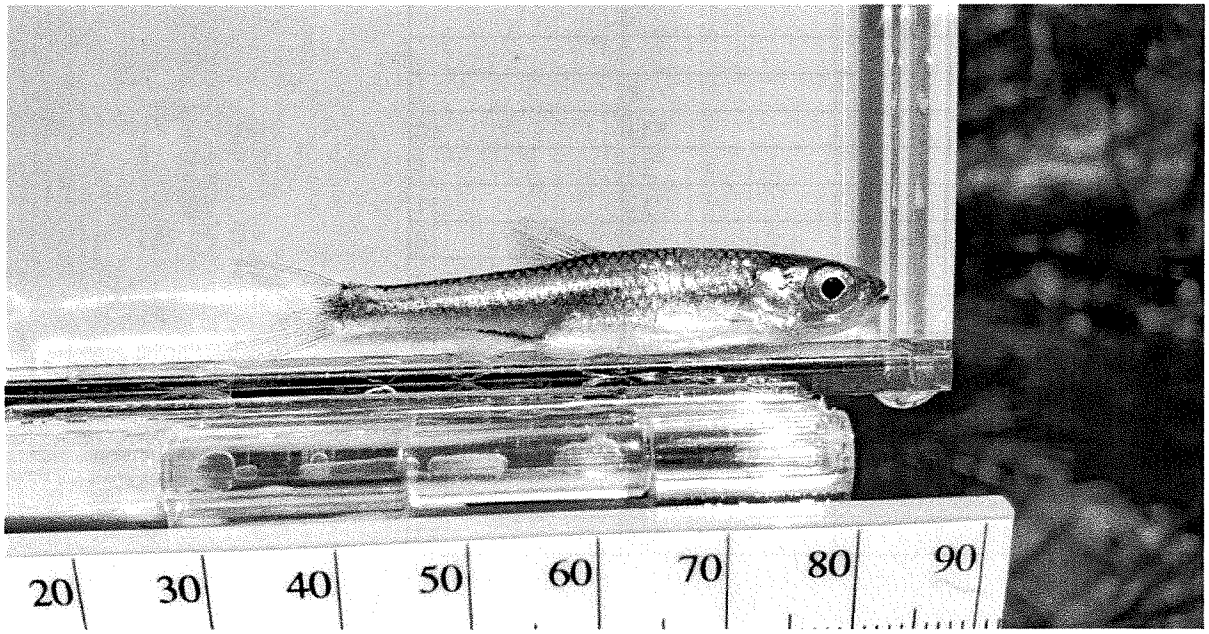
Guadalupe roundnose minnow (*Dionda nigrotaeniata*), a Texas endemic native to the Guadalupe River basin in central Texas.



Longear sunfish (*Lepomis megalotis*), sporting spectacular deep-orange colors on pelvic, soft-dorsal, and anal fins, from Honey Creek in September 2019. Colors are dulled in this photo compared to individuals immediately following capture. The color patterns and markings on specimens from Honey Creek are sufficiently distinct that they may be a subspecies.



Mexican tetra (*Astyanax mexicanus*) from Honey Creek, September 2019. The only species of the order Characiformes (includes Piranhas) native to the United States, although this represents a range expansion (formerly limited to Rio Grande basin, south Texas).



Texas shiner (*Notropis amabilis*) from lower Honey Creek, September 2019. Endemic to south-central Texas.

Honey Creek: Fish Assemblage Composition

Table Honey.2: Fish assemblages supported several species that are either endemic only to the Hill Country or have limited distribution in Texas and northern Mexico. These species include Guadalupe Bass, greenthroat darter, Texas shiner, and Guadalupe roundnose minnow. We also collected several longear sunfish with very unique color patterns that may be an unknown subspecies yet to be described. Note that the first column represents the total number of individuals collected, whereas the second column is the number of juveniles (as part of the total number).

Honey Creek, Lower		
Blacktail Shiner	9	0
Central Stoneroller	81	0
Greenthroat Darter	117	0
Guadalupe Bass	6	5
Guadalupe Roundnose Minnow	56	3
Largemouth Bass	1	1
Longear Sunfish	29	0
Mexican Tetra	23	0
Redspotted Sunfish	18	0
Texas Shiner	11	3
Warmouth	3	1
Yellow Bullhead	1	1
Total	**355**	**14**
Honey Creek, Upper		
Blacktail Shiner	3	1
Central Stoneroller	243	18
Greenthroat Darter	34	6
Guadalupe Bass	11	11
Guadalupe Roundnose Minnow	2	0
Largemouth Bass	4	4
Longear Sunfish	89	2
Mexican Tetra	15	0
Redspotted Sunfish	19	3
Warmouth	3	0
Western Mosquitofish	26	0
Yellow Bullhead	14	8
Total	**463**	**53**

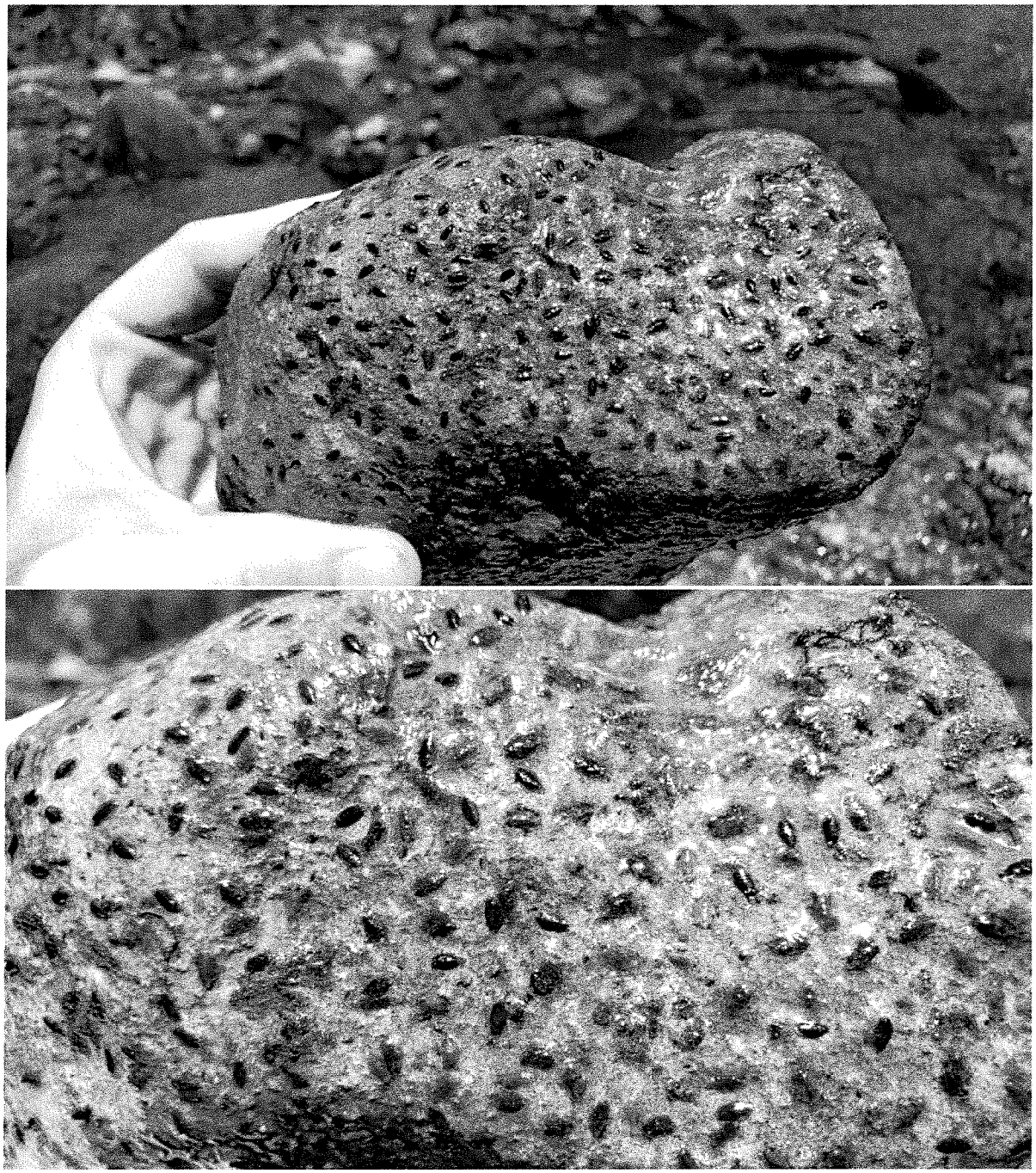


Image Honey.1: Leucotrichia sarita *larval fixed retreats (cases) attached to rocks in the lower reach at Honey Creek during August 2019. This species is a spring-dwelling specialist that requires high levels of dissolved oxygen and is likely vulnerable to nutrient enrichment.*

Honey Creek: Macroinvertebrate Taxonomic Composition

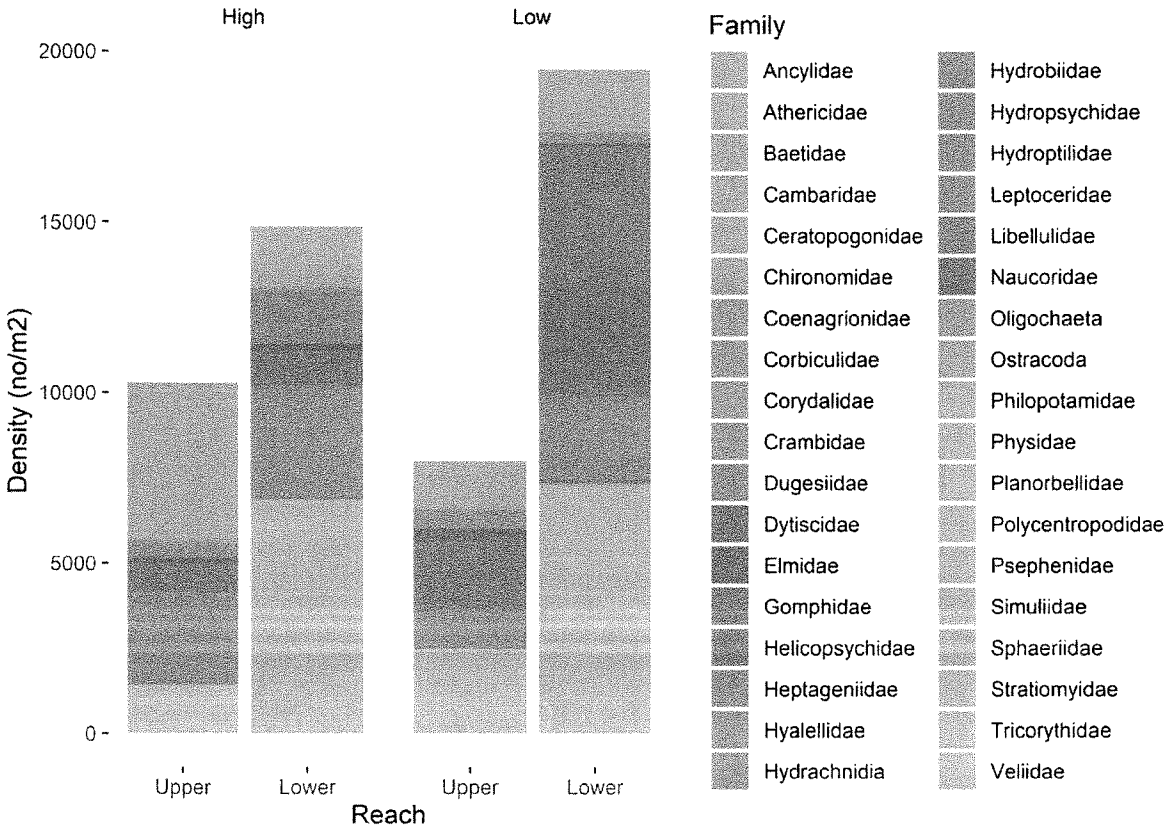


Figure Honey.10: Stacked bar plot of macroinvertebrate taxonomic composition by family densities. Both reaches were similar in composition. The lower reach, in particular, supported densities of a unique, spring-dwelling caddisfly (Leucotrichia sarita) that grazes on biofilms attached to rocks in fast-flowing water (see Image Honey.1, next). This taxon may represent a species of concern and certainly is one that could be affected by wastewater inputs. Several other caddisfly genera were also only found at Honey Creek (compared to Barton, Blanco, and Onion) and were thus unique to the study. These genera, which were not identified to species because they cannot be identified as larvae, should be viewed as potentially vulnerable to any wastewater inputs into the stream.

Honey Creek: Macroinvertebrate Densities

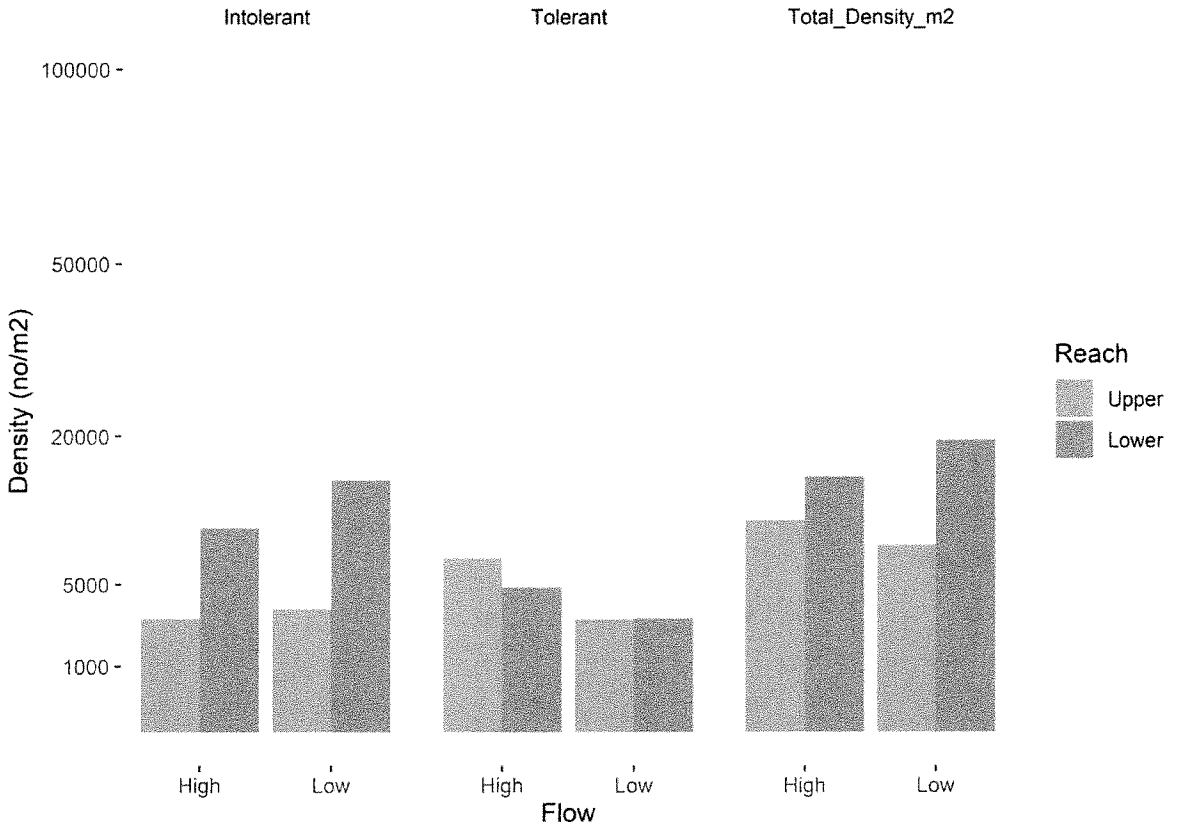


Figure Honey.9: Macroinvertebrate community composition was similar between reaches. Both reaches (see Table Honey.1, previous) had about 30 taxa, regardless of season. Using the TCEQ Multimetric Index, both reaches were deemed "Exceptional" in terms of their Aquatic Life Use (ALU) Designation based on macroinvertebrate communities with the exception of the upper reach during May 2019, when it was classified as "High". Note that the Upper reach has naturally high levels of organic matter, almost resembling a soft-bottomed stream of the coastal plain, and thus some of the taxa present may be unduly classified as indicative of organic pollution when, in fact, the organic matter is natural.

LOW FLOW, Upper Reach

Metric	Value	Score	4	3	2	1
Taxa Richness	**38**	4	>21	15-21	8-14	<8
# EPT	**9**	3	>9	7-9	4-6	<4
HBI	**4.42**	3	<3.77	3.77-4.52	4.53-5.27	>5.27
% Chironomidae	**9.28**	3	0.79-4.10	4.11-9.48	9.49-16.19	<0.79 or >16.19
% Most Dominant Taxa (*Heliocpsyche*)	**26.22**	3	<22.15	22.15-31.01	31.02-39.88	>39.88
% Most Dominant FFG (SCR)	**34.17**	4	<36.50	36.50-45.30	45.31-54.12	>54.12
% Predators	**21.52**	3	4.72-15.20	15.21-25.67	25.68-36.14	<4.73 or >36.14
Ratio Intolerant (<6) /Tolerant (≥6)	**1.19**	1	>4.79	3.21-4.79	1.63-3.20	<1.63
% Trichoptera as Hydropsychidae	**0.53**	4	<25.50	25.51-50.50	50.51-75.50	>75.50 or none
# Non-insect Taxa	**9**	4	>5	4-5	2-3	<2
% Collector-Gatherers	**23.92**	3	8.00-19.23	19.24-30.46	30.47-41.68	<8.00 or >41.68
% Elmidae	**4.10**	4	0.88-10.04	10.05-20.08	20.09-30.12	<0.88 or >30.12
Aquatic Life Use Designation	**EXCEPTIONAL**	39				
Exceptional	>36					
High	29-36					
Intermediate	22-28					
Low	<22					

Low Flow, Lower Reach

Metric	Value	Score	4	3	2	1
Taxa Richness	**34**	4	>21	15-21	8-14	<8
# EPT	**13**	4	>9	7-9	4-6	<4
HBI	**3.30**	4	<3.77	3.77-4.52	4.53-5.27	>5.27
% Chironomidae	**5.82**	3	0.79-4.10	4.11-9.48	9.49-16.19	<0.79 or >16.19
% Most Dominant Taxa (*Helicopsyche*)	**37.48**	2	<22.15	22.15-31.01	31.02-39.88	>39.88
% Most Dominant FFG (SCR)	**53.84**	2	<36.50	36.50-45.30	45.31-54.12	>54.12
% Predators	**9.70**	4	4.72-15.20	15.21-25.67	25.68-36.14	<4.73 or >36.14
Ratio Intolerant (<6) /Tolerant (≥6)	**4.89**	4	>4.79	3.21-4.79	1.63-3.20	<1.63
% Trichoptera as Hydropsychidae	**1.42**	4	<25.50	25.51-50.50	50.51-75.50	>75.50 or none
# Non-insect Taxa	**8**	4	>5	4-5	2-3	<2
% Collector-Gatherers	**24.39**	2	8.00-19.23	19.24-30.46	30.47-41.68	<8.00 or >41.68
% Elmidae	**0.68**	1	0.88-10.04	10.05-20.08	20.09-30.12	<0.88 or >30.12
Aquatic Life Use Designation	**EXCEPTIONAL**	38				
Exceptional	>36					
High	29-36					
Intermediate	22-28					
Low	<22					

Honey Creek: Macroinvertebrates Community Metrics and ALU Designation

Table Honey.1

HIGH FLOW, Upper Reach

Metric	Value	Score	4	3	2	1
Taxa Richness	32	4	>21	15-21	8-14	<8
# EPT	11	4	>9	7-9	4-6	<4
HBI	5.26	2	<3.77	3.77-4.52	4.53-5.27	>5.27
% Chironomidae	39.07	1	0.79-4.10	4.11-9.48	9.49-16.19	<0.79 or >16.19
% Most Dominant Taxa (Orthocladinae)	27.21	3	<22.15	22.15-31.01	31.02-39.88	>39.88
% Most Dominant FFG (CG)	44.02	3	<36.50	36.50-45.30	45.31-54.12	>54.12
% Predators	15.15	4	4.72-15.20	15.21-25.67	25.68-36.14	<4.73 or >36.14
Ratio Intolerant (<6) /Tolerant (≥6)	0.43	1	>4.79	3.21-4.79	1.63-3.20	<1.63
% Trichoptera as Hydropsychidae	3.51	4	<25.50	25.51-50.50	50.51-75.50	>75.50 or none
# Non-insect Taxa	7	4	>5	4-5	2-3	<2
% Collector-Gatherers	44.02	1	8.00-19.23	19.24-30.46	30.47-41.68	<8.00 or >41.68
% Elmidae	1.55	4	0.88-10.04	10.05-20.08	20.09-30.12	<0.88 or >30.12
Aquatic Life Use Designation	HIGH	35				
Exceptional	>36					
High	29-36					
Intermediate	22-28					
Low	<22					

High flow, Lower Reach

Metric	Value	Score	4	3	2	1
Taxa Richness	33	4	>21	15-21	8-14	<8
# EPT	14	4	>9	7-9	4-6	<4
HBI	4.60	2	<3.77	3.77-4.52	4.53-5.27	>5.27
% Chironomidae	4.37	3	0.79-4.10	4.11-9.48	9.49-16.19	<0.79 or >16.19
% Most Dominant Taxa (*Tricorythodes*)	19.15	4	<22.15	22.15-31.01	31.02-39.88	>39.88
% Most Dominant FFG (CG)	34.91	4	<36.50	36.50-45.30	45.31-54.12	>54.12
% Predators	16.04	3	4.72-15.20	15.21-25.67	25.68-36.14	<4.73 or >36.14
Ratio Intolerant (<6) /Tolerant (≥6)	1.99	2	>4.79	3.21-4.79	1.63-3.20	<1.63
% Trichoptera as Hydropsychidae	42.19	3	<25.50	25.51-50.50	50.51-75.50	>75.50 or none
# Non-insect Taxa	9	4	>5	4-5	2-3	<2
% Collector-Gatherers	34.91	2	8.00-19.23	19.24-30.46	30.47-41.68	<8.00 or >41.68
% Elmidae	1.34	4	0.88-10.04	10.05-20.08	20.09-30.12	<0.88 or >30.12
Aquatic Life Use Designation	EXCEPTIONAL	39				
Exceptional	>36					
High	29-36					
Intermediate	22-28					
Low	<22					

Honey Creek: Diatom Species Community Metrics

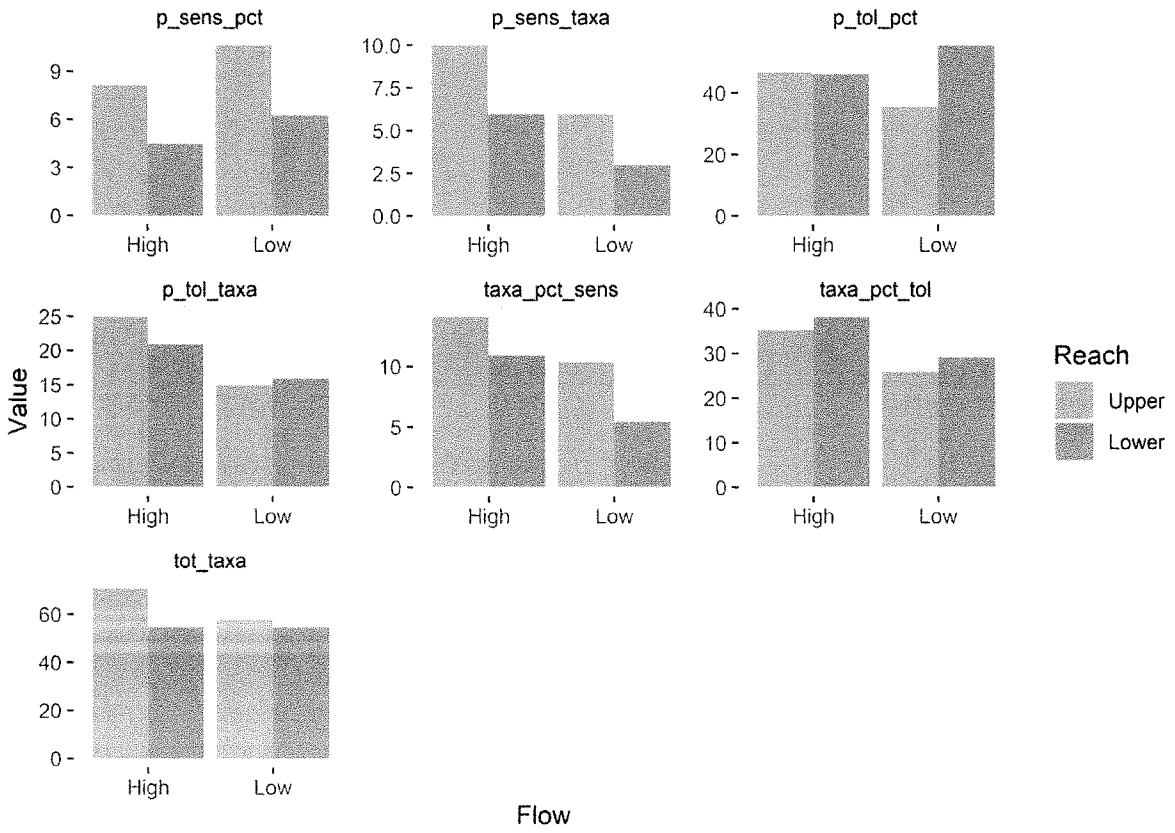


Figure Honey.8: Diatom species richness was very high in both reaches, with the lower reach supporting 71 species during one of the events. Richness and abundance of phosphorus (P) sensitive taxa were slightly lower than that of tolerant taxa. However, the extremely high species richness (diversity) of diatoms and the unique environmental conditions found here due to spring-fed conditions and low levels of light (high canopy cover) may also be responsible for the types of species found here. Clearly, no stream in the current study supported nearly as many species of diatoms as Honey Creek, regardless of how they are classified in terms of P sensitivity or tolerance. Thus, Honey Creek supported exceptional diversity of diatoms.

Honey Creek: *Cladophora glomerata* (Nuisance Filamentous Green Alga) and Total Soft Algal Biovolume

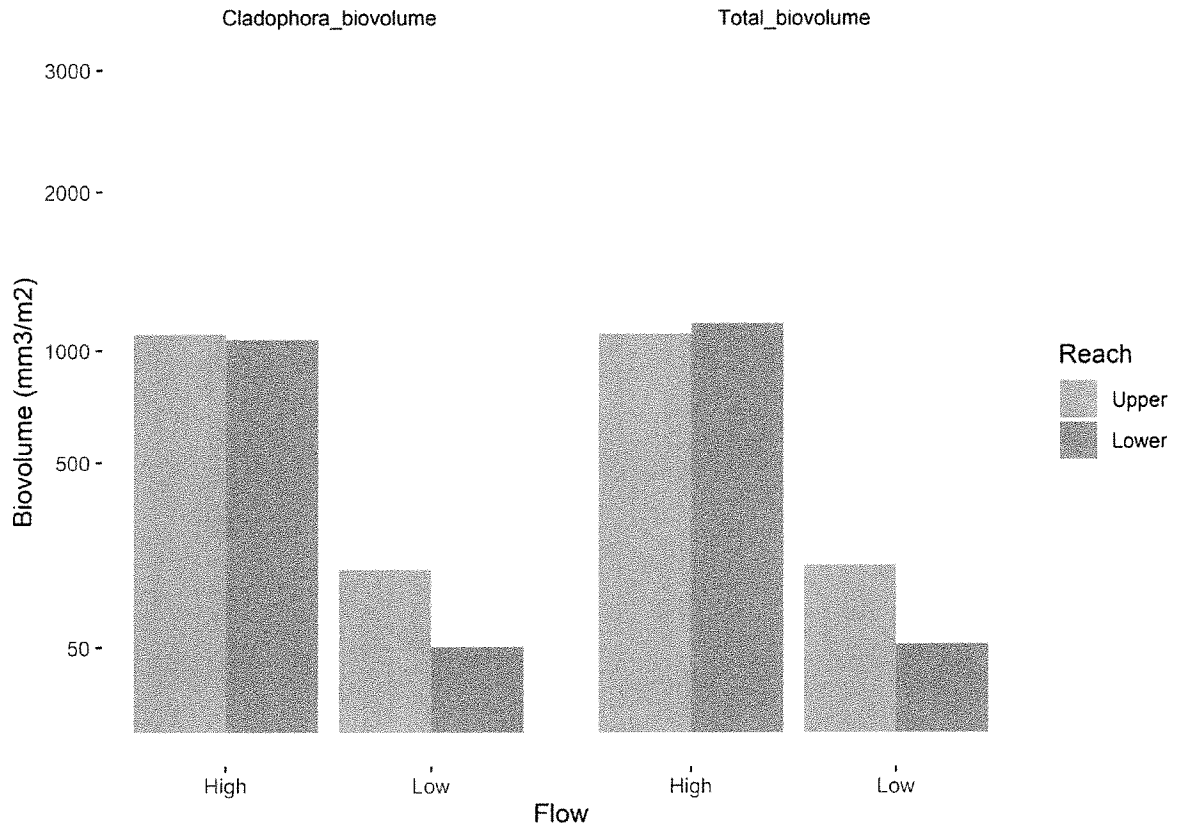


Figure Honey.7: Biomass of Cladophora glomerata, the most common nuisance filamentous green algal species associated with excessive nutrient enrichment, was moderately high in both reaches during May 2019. However, levels of Cladophora biovolume were still far lower than Blanco River at Blanco Settlement during the April 2019 bloom. Moreover, our estimates of Cladophora biovolume at the Blanco River came after a runoff event that scoured much of the stream bottom and washed filaments of Cladophora downstream, so our Blanco River estimates are low relative to the peak of the bloom in the water body. Regardless, increases in nutrient levels in Honey Creek could facilitate proliferation of Cladophora and harm biological integrity of the ecosystem.

Honey Creek: Periphyton Stable Isotopic Ratios for Carbon and Nitrogen

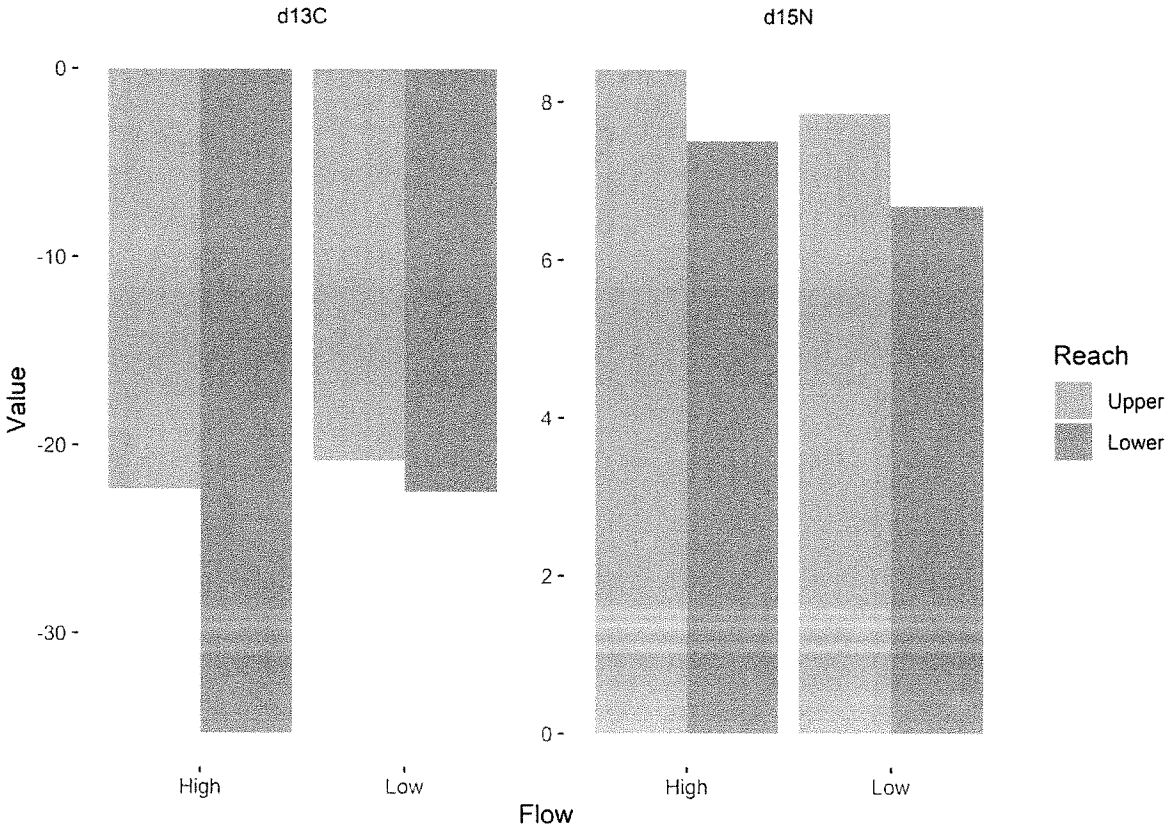


Figure Honey.6: Periphyton stable isotopic ratios for nitrogen (δ15N) were similar between reaches and seasons. Both reaches had δ15N values around 8, which is similar to levels found in Barton Creek, but much lower than levels found in the lower reach of Blanco River. The δ15N values may be indicating some early signs of septic or other animal source of nitrogen in the system.

Honey Creek: Periphyton (Benthic Algae) Biomass

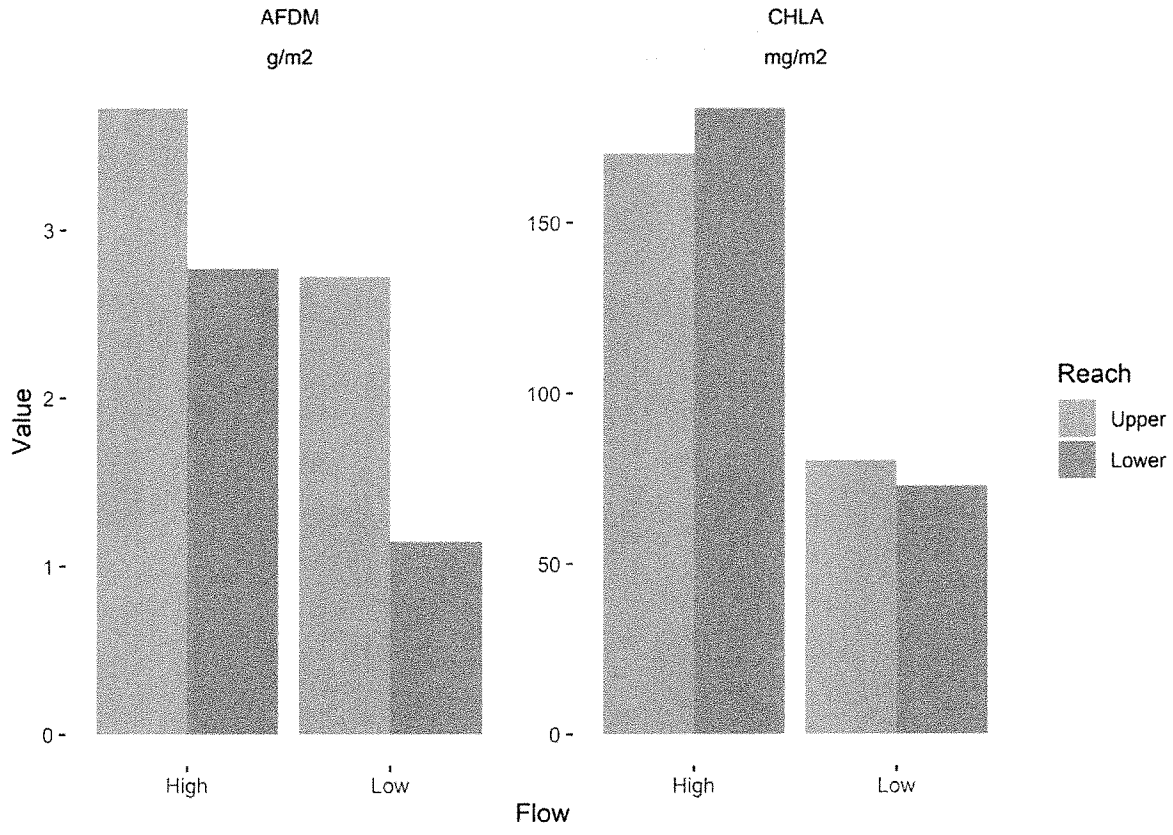


Figure Honey.6: Periphyton (benthic algae) biomass was moderately high in both reaches during the spring, high flow period. Both reaches supported similar levels of algal biomass. Maximum benthic chlorophyll-a was approximately 150 mg/m^2.The algal biomass observed during May 2019 was approaching levels that one might observe in streams impacted by excessive nutrient enrichment. This implies that small inputs of nutrients, particularly phosphorus, could cause nuisance levels of algae to proliferate.

Honey Creek: Seston (Organic Matter, Phytoplankton, and Total Particulates in Water Column)

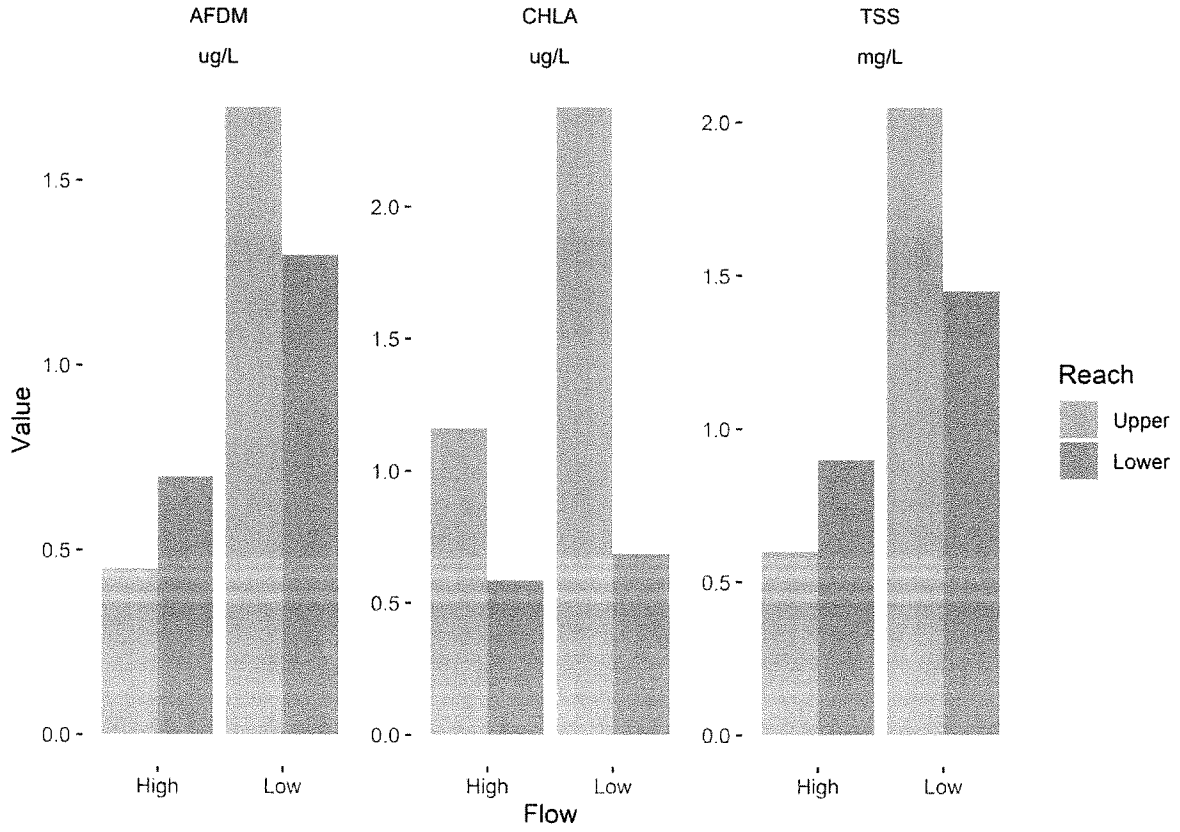


Figure Honey.4: Sestonic organic matter (ash-free dry mass particulates floating in the water column), chlorophyll-a (phytoplankton and other algae floating in water column), and total suspended solids (TSS; all particles, including silt, clay, etc.) were consistent with high-quality, reference stream conditions in both reaches during both high and low flow events. Chlorophyll-a trended slightly higher in the upper reach, which had lower flow and longer residence time, but even there, it was quite low.

Honey Creek: EXO1 24 h (Diel) Water Quality Parameters

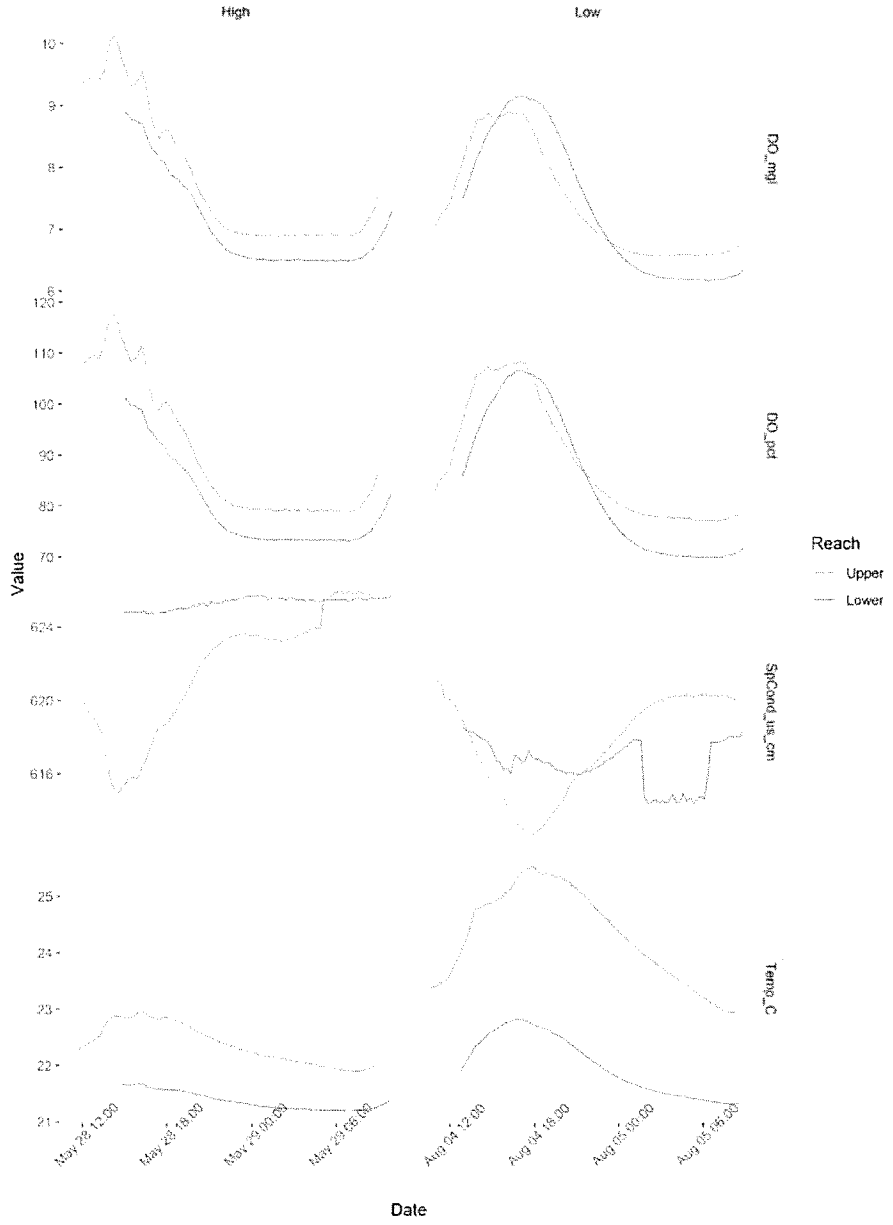


Figure Honey.3: Dissolved oxygen levels were high and remained at or above levels that are supportive of natural biological communities in Texas streams. EXO1 sondes, which were deployed to capture 15-minute intervals of dissolved oxygen and other parameters, revealed similar DO levels between the two reaches during the day and night. Temperature fluctuations were greater in the upper reach, which had lower flow than the lower reach, especially during the heat of August. Thus, the lower reach's larger discharge from groundwater helps buffer its temperature better than the upper part of the stream.

Honey Creek: YSI EXO1 Data Sonde Parameters, Instantaneous

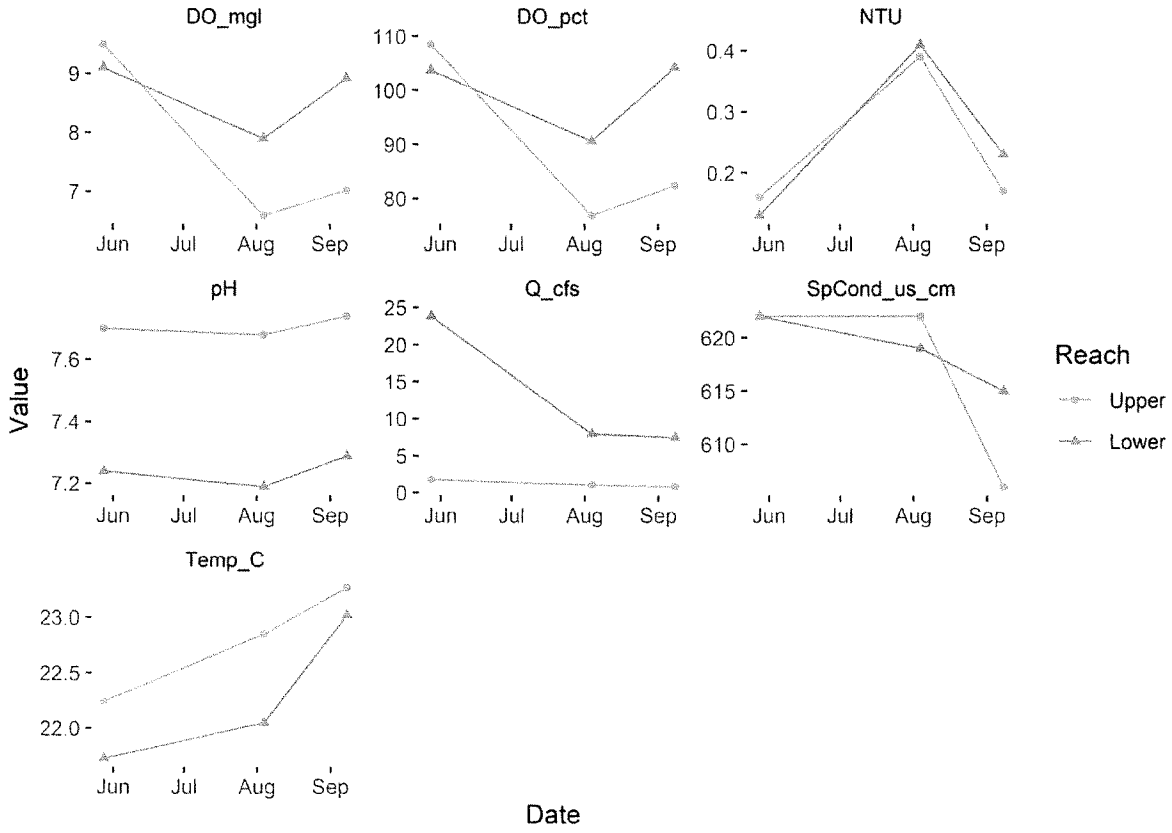


Figure Honey.2: Dissolved oxygen (DO; units are milligrams per liter (mgl) and percent saturation (pct)), turbidity (NTU, a measure of water clarity), pH (acidity), stream flow (Q_cfs, or cubic-feet per second), specific conductance (SpCond_us_cm; units are microsiemens per centimeter), and water temperature (degrees Celsius) measured in the early morning (Upper) and mid-morning (Lower) reaches of Honey Creek during summer 2019. The tendency for the Upper reach to have warmer temperatures is related to lower groundwater inputs relative to the Lower reach, which has a much larger spring that contributes substantially higher stream flow (Q_cfs) and thus buffers the water temperature more than the upstream reach. NTU levels at both reaches were extremely low. NTU was not measured in May. The two reaches were otherwise quite similar in specific conductance, but the upper reach tended to have slightly higher pH.

Honey Creek: Nutrients

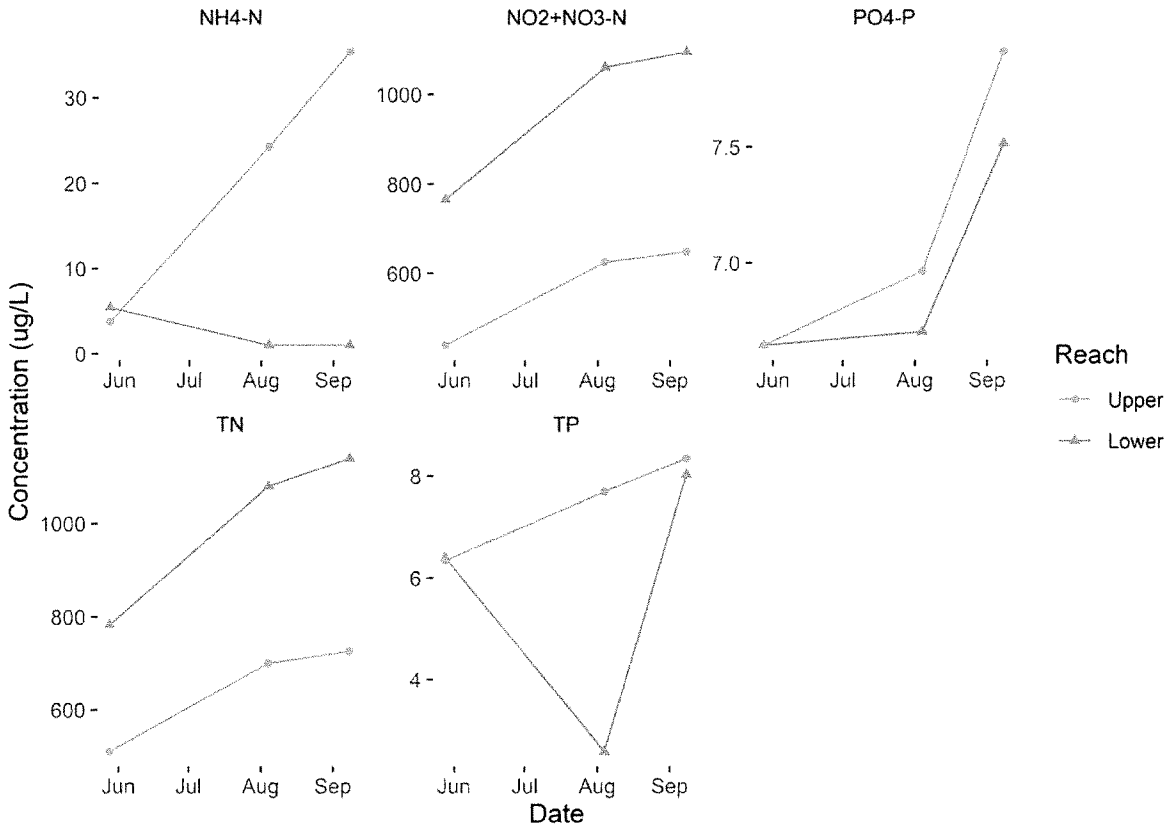


Figure Honey.1: Phosphorus levels were consistent with a high-quality, reference stream in the Edwards Plateau or Cross Timbers Ecoregions of central Texas, with total and orthophosphate (PO_4-P)-phosphorus values < 10 µg/L. However, total nitrogen (TN) and nitrite+nitrate-N values were relatively high and approached 1 mg/L at the lower reach during low flow conditions. This implies that the groundwater is already contaminated with nitrate-N, which is probably associated with application of industrial fertilizers on residential lawns or croplands rather than wastewater or septic systems. This hypothesis is based on the fact that periphyton δ15N values in both reaches during both events were similar and below levels usually associated with human or animal waste sources of nitrogen (e.g., see Results from lower Blanco River and lower Onion Creek). Nevertheless, Honey Creek may already have a nitrogen enrichment problem that would only be exacerbated by any additional nutrient inputs, particularly phosphorus.

Periphyton stable isotopic ratios for nitrogen (δ15N) were similar between reaches and seasons. Both reaches had δ15N values around 8, which is similar to levels found in Barton Creek, but much lower than levels found in the lower reach of Blanco River.

Biomass of *Cladophora glomerata*, the most common nuisance filamentous green algal species associated with excessive nutrient enrichment, was moderately high in both reaches during May 2019. However, levels of *Cladophora* biovolume were still far lower than Blanco River at Blanco Settlement during the April 2019 bloom. Moreover, our estimates of Cladophora biovolume at the Blanco River came after a runoff event that scoured much of the stream bottom and washed filaments of Cladophora downstream, so our Blanco River estimates are low relative to the peak of the bloom in the water body. Regardless, increases in nutrient levels in Honey Creek could facilitate proliferation of *Cladophora* and harm biological integrity of the ecosystem.

Diatom species richness was very high in both reaches, with the lower reach supporting 71 species during one of the events. Richness and abundance of phosphorus (P) sensitive taxa were slightly lower than that of tolerant taxa. However, the extremely high species richness (diversity) of diatoms and the unique environmental conditions found here due to spring-fed conditions and low levels of light (high canopy cover) may also be responsible for the types of species found here. Clearly, no stream in the current study supported nearly as many species of diatoms as Honey Creek, regardless of how they are classified in terms of P sensitivity or tolerance. Thus, Honey Creek supported exceptional diversity of diatoms.

Macroinvertebrate community composition was similar between reaches. Both reaches had about 30 taxa, regardless of season. Using the TCEQ Multimetric Index, both reaches were deemed "Exceptional" in terms of their Aquatic Life Use Designation based on macroinvertebrate communities with the exception of the upper reach during May 2019, when it was classified as "High". Note that the Upper reach has naturally high levels of organic matter, almost resembling a soft-bottomed stream of the coastal plain, and thus some of the taxa present may be unduly classified as indicative of organic pollution when, in fact, the organic matter is natural. Both reaches supported relatively high densities of a unique, spring-dwelling caddisfly (*Leucotrichia sarita*) that grazes on biofilms attached to rocks in fast-flowing water. This taxon may represent a species of concern and certainly is one that could be affected by wastewater inputs. Several other caddisfly genera were also only found at Honey Creek (compared to Barton, Blanco, and Onion) and were thus unique to the study. These genera, which were not identified to species because they cannot be identified as larvae, should be viewed as potentially vulnerable to any wastewater inputs into the stream.

Fish assemblages supported several species that are either endemic only to the Hill Country or have limited distribution in Texas and northern Mexico. These species include Guadalupe Bass, greenthroat darter, Texas shiner, and Guadalupe roundnose minnow. We also collected several longear sunfish with very unique color patterns that may be an unknown subspecies yet to be described.

Results

HONEY CREEK

Summary

Honey Creek Upper and Lower Reaches were relatively dissimilar in their physical habitat and flow regime. The channel of the upper reach tended to be broken up in braids that spanned a wide, peat-based floodplain with substantial canopy cover from *Taxodium distichum* (bald cypress). The lower reach was also well-canopied by bald cypress, but had a more defined channel, much higher stream flow from a large spring that discharges just upstream of the reach, faster stream velocity, and larger, hard substrate (cobble and small boulders). Substrate in the upper reach tended to be softer, more depositional, and organic than the lower reach. These differences played a role in some differences in chemical and biological condition of the two reaches, but also make them uniquely sensitive to potential nutrient enrichment from wastewater.

Honey Creek phosphorus levels were consistent with a high-quality, reference stream in the Edwards Plateau or Cross Timbers Ecoregions of central Texas, with total and orthophosphate (PO_4-P)-phosphorus values < 10 µg/L. However, total nitrogen (TN) and nitrite+nitrate-N values were relatively high and approached 1 mg/L at the lower reach during low flow conditions. This implies that the groundwater is already contaminated with nitrate-N, which is probably associated with application of industrial fertilizers on residential lawns or croplands rather than wastewater or septic systems. This hypothesis is based on the fact that periphyton δ15N values in both reaches during both events were similar and below levels usually associated with human or animal waste sources of nitrogen (e.g., see Results from lower Blanco River and lower Onion Creek). Nevertheless, Honey Creek may already have a nitrogen enrichment problem that would only be exacerbated by any additional nutrient inputs, particularly phosphorus.

Dissolved oxygen levels were high and remained at or above levels that are supportive of natural biological communities in Texas streams. EXO1 sondes, which were deployed to capture 15-minute intervals of dissolved oxygen and other parameters, revealed similar DO levels between the two reaches during the day and night. Temperature fluctuations were greater in the upper reach, which had lower flow than the lower reach, especially during the heat of August. Thus, the lower reach's larger discharge from groundwater helps buffer its temperature better than the upper part of the stream.

Sestonic organic matter (ash-free dry mass particulates), chlorophyll-a (phytoplankton), and total suspended solids were consistent with high-quality, reference stream conditions in both reaches during both high and low flow events.

Periphyton (benthic algae) biomass was moderately high in both reaches during the spring, high flow period. Both reaches supported similar levels of algal biomass. Maximum benthic chlorophyll-a was approximately 150 mg/m^2. The algal biomass observed during May 2019 was approaching levels that one might observe in streams impacted by excessive nutrient enrichment. This implies that small inputs of nutrients, particularly phosphorus, could cause nuisance levels of algae to proliferate.

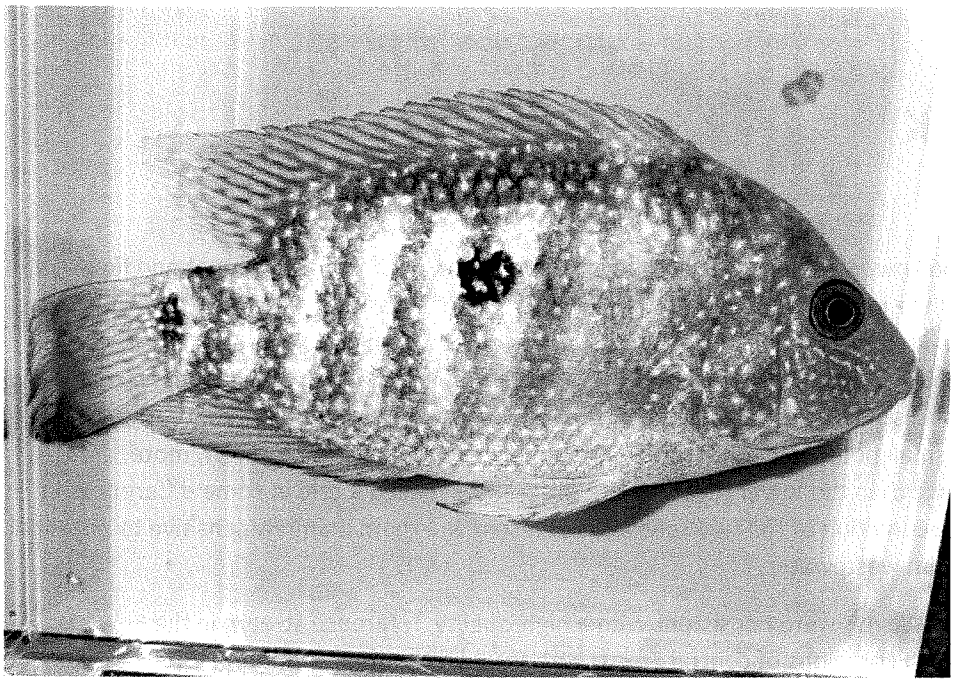


Image Blanco.4: Rio Grande Cichlid adult, Blanco River, October 2019.

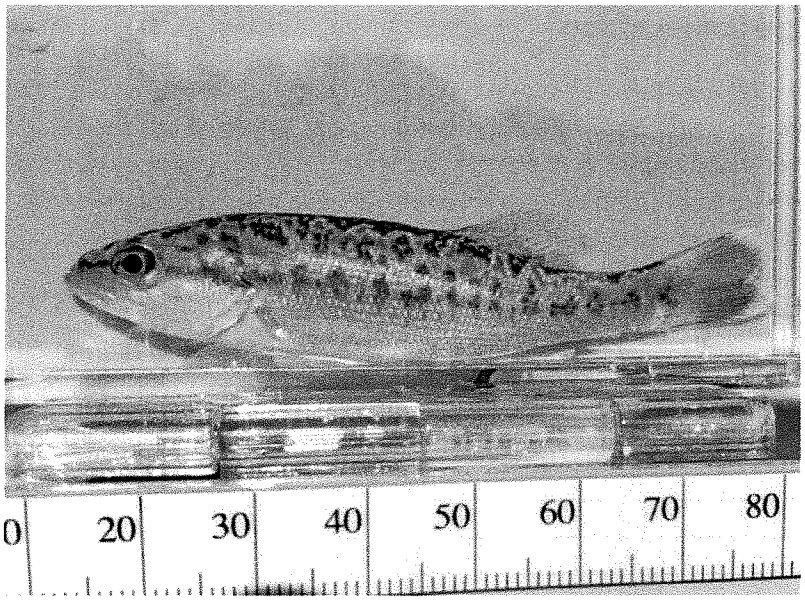


Image Blanco.2: Juvenile Guadalupe Bass, Blanco River, October 2019

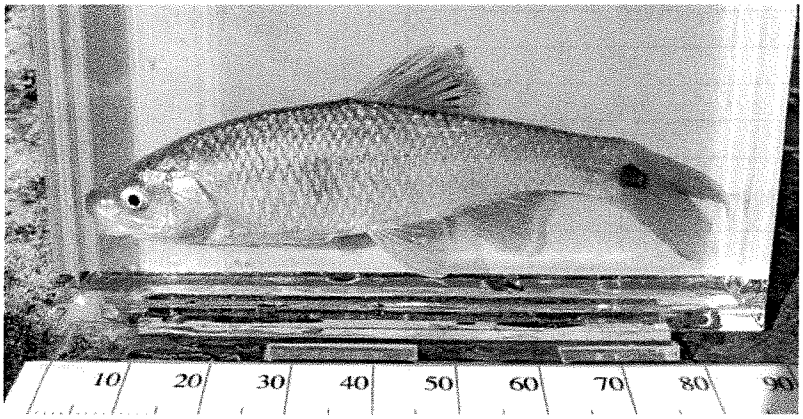


Image Blanco.3. Blacktail Shiner adult male in spawning colors, Blanco R., October 2019.

Blanco River: Fish Assemblage Composition

Table Blanco.2: Fish assemblages were relatively similar between reaches in terms of species composition. However, numerical abundance of fish, particularly fish that graze heavily on algae (e.g., central stonerollers) and shiner species that eat drifting Baetis nymphs were particularly abundant at the lower reach. The upper reach had low numbers of fish but several large individuals of largemouth bass, longear sunfish, redear sunfish, and good numbers of juvenile Guadalupe bass.

Blanco River, Lower		
Blacktail Shiner	1052	495
Bluegill	127	11
Central Stoneroller	46	0
Channel Catfish	6	1
Flathead Catfish	1	0
Green Sunfish	15	0
Guadalupe Bass	8	8
Largemouth Bass	9	2
Longear Sunfish	149	12
Redbreast Sunfish	154	0
Redear Sunfish	3	0
Rio Grande Cichlid	18	2
Western Mosquitofish	52	17
Total	**1640**	**548**
Blanco River, Upper		
Blacktail Shiner	210	45
Bluegill	1	0
Central Stoneroller	10	0
Channel Catfish	1	1
Green Sunfish	4	0
Guadalupe Bass	4	4
Largemouth Bass	12	3
Lepomis spp.	17	1
Longear Sunfish	17	6
Redbreast Sunfish	3	1
Redear Sunfish	9	0
Western Mosquitofish	27	0
Total	**315**	**61**

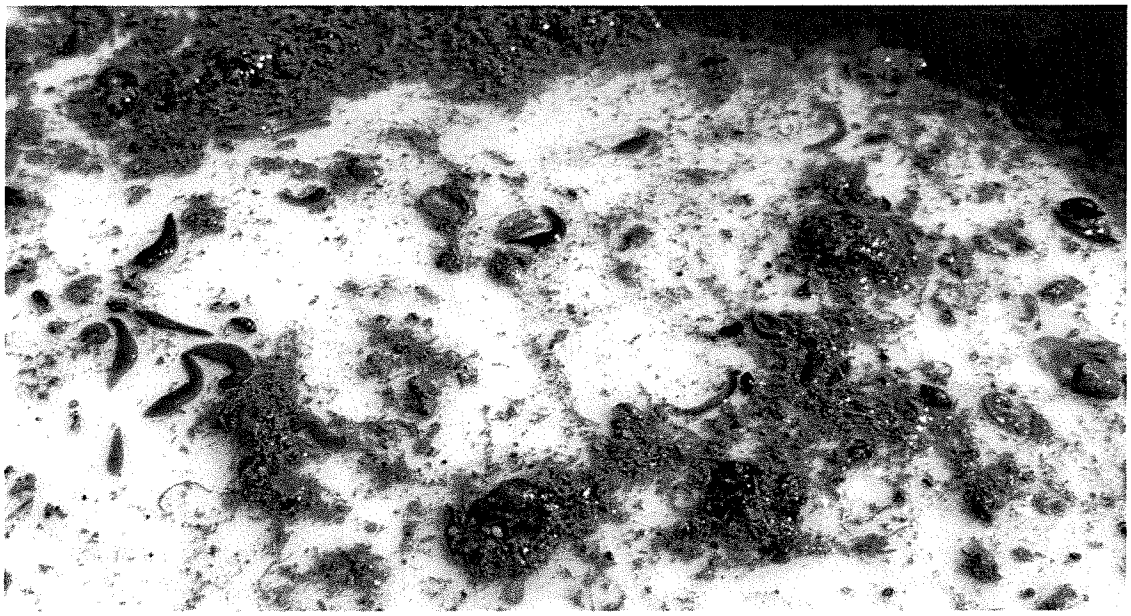


Image Blanco.1. Flatworms, leeches, aquatic worms, and lunged snails from the bottom of the Blanco River at Blanco Settlement, April 2019. These are not typical taxa from Hill Country streams.

Blanco River: Densities of Macroinvertebrate Taxa Commonly Found Below Wastewater Treatment Plants

(Data from early season, higher flow period following the significant algal bloom at Blanco Settlement)

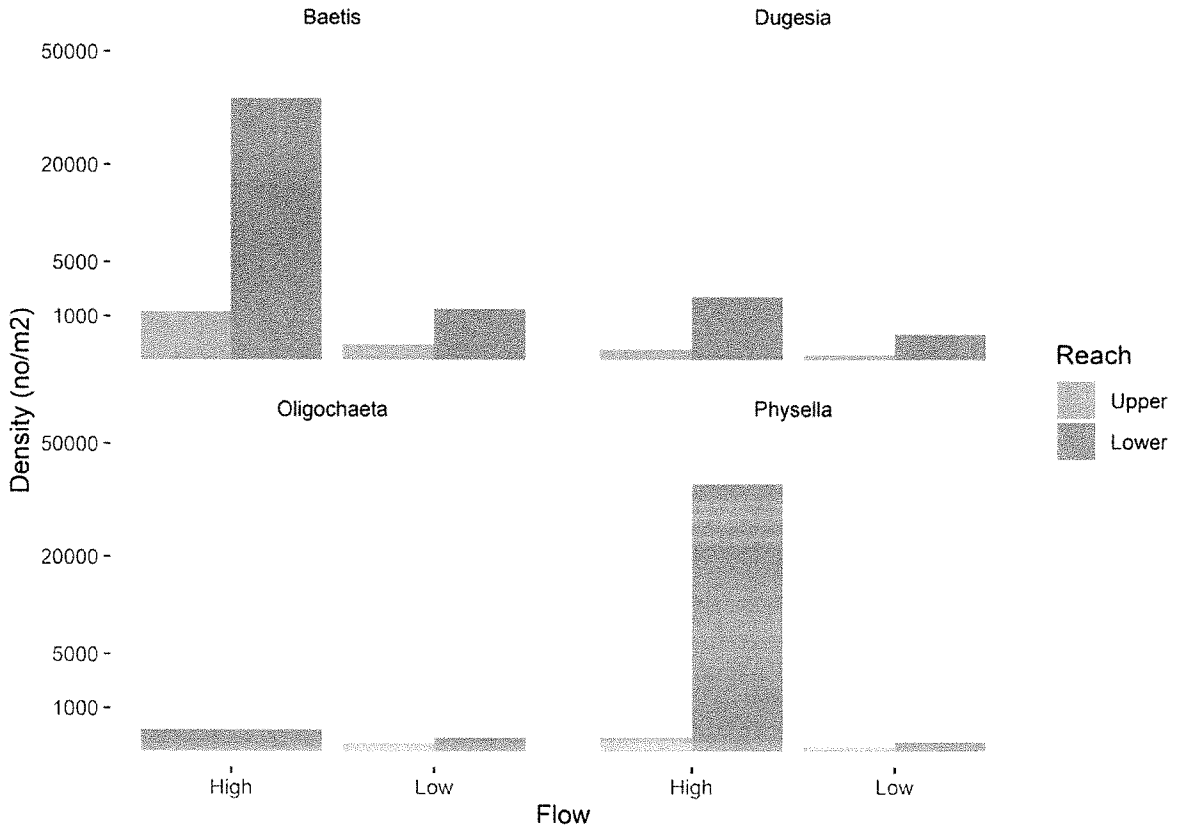


Figure Blanco.11. Densities of flatworms (Dugesiidae), air-breathing snails (Physidae), segmented worms (Oligochaeta), and a very tolerant mayfly genus (Baetis) dominated the taxonomic composition at the lower reach during April 2019, which coincided with a large bloom of nuisance algae.

Blanco River: Macroinvertebrate Taxonomic Composition

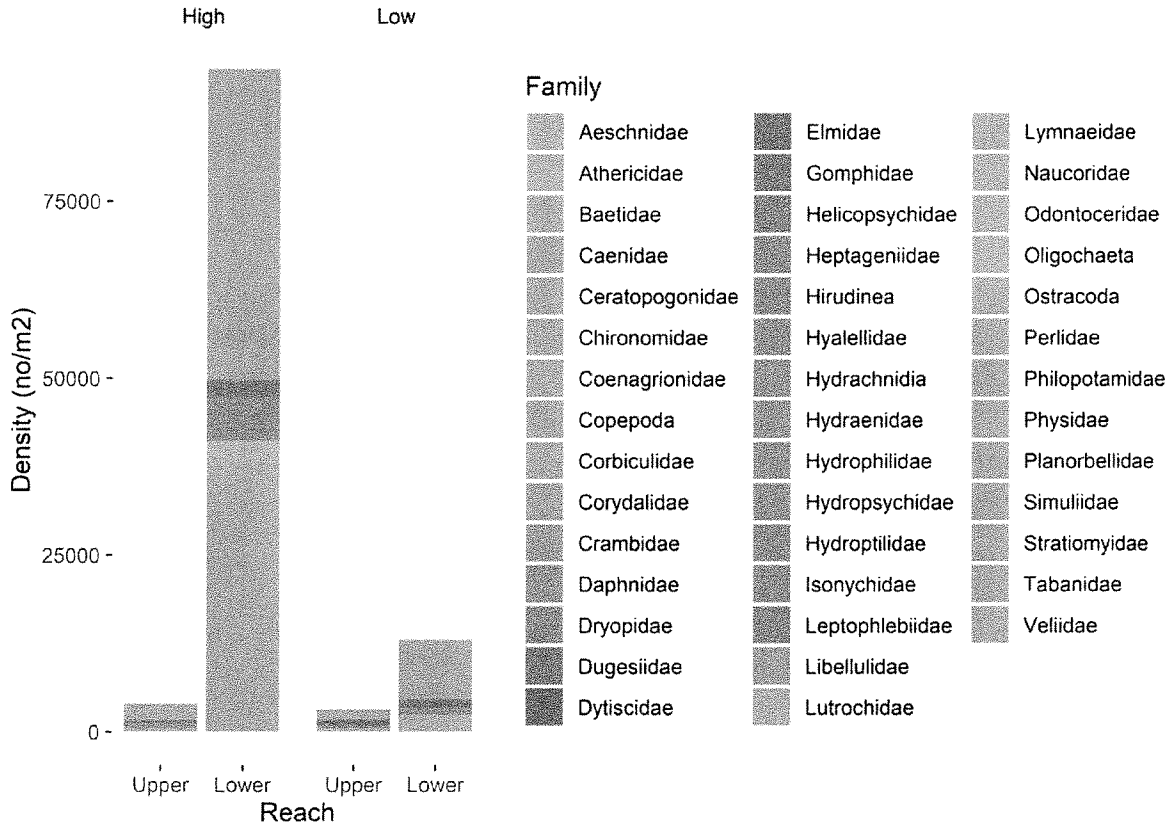


Figure Blanco.10. Stacked bar plot of macroinvertebrate taxonomic composition by families. See next plot for illustration of difference between upper and lower reaches during April (the bloom event) for a few key taxa that are typical of wastewater discharges.

Blanco River: Macroinvertebrate Densities

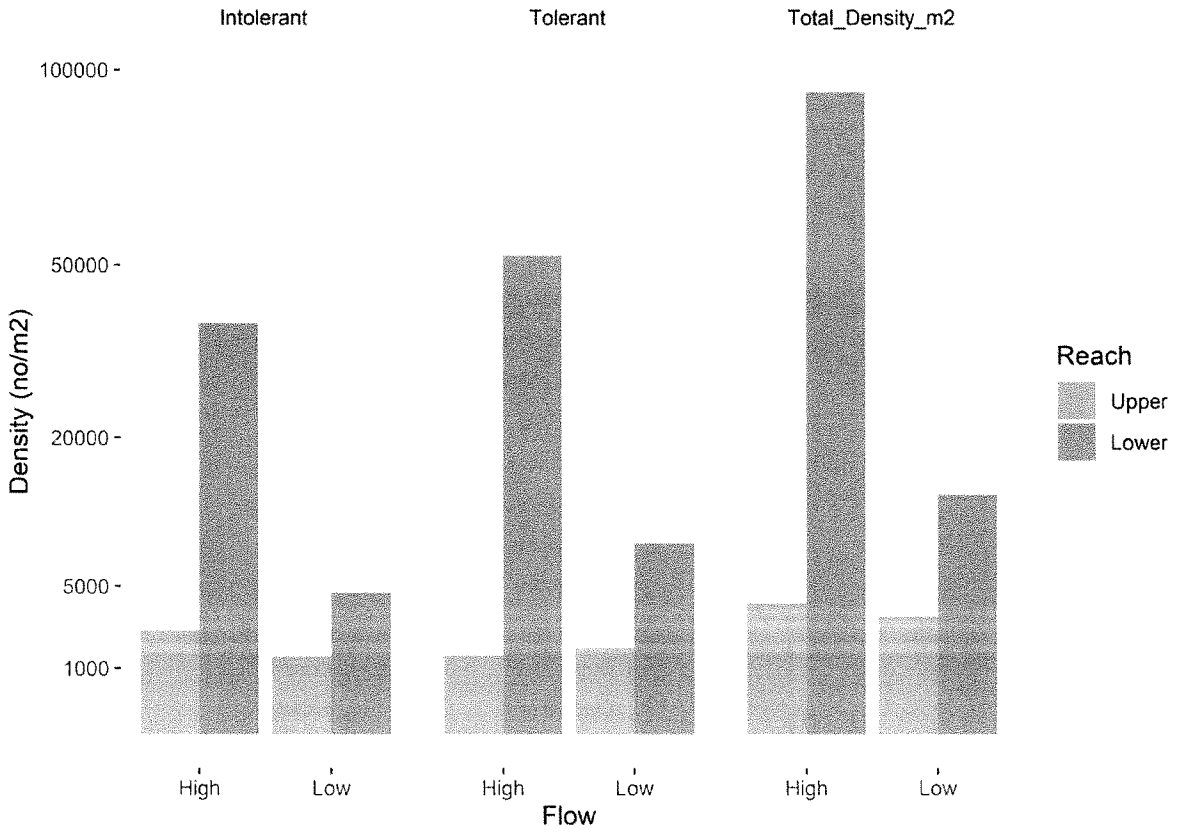


Figure Blanco.9: Densities of Tolerant, Intolerant, and Total macroinvertebrates during April (high flow) and August (low flow) at the Upper and Lower Reaches of the Blanco River. Densities of all macroinvertebrates were extraordinarily high at the lower reach, especially during April (high flow), which coincided with the algal bloom.

LOW FLOW, Upper Reach

Metric	Value	Score	4	3	2	1
Taxa Richness	**39**	4	>21	15-21	8-14	<8
# EPT	**9**	3	>9	7-9	4-6	<4
HBI	**4.51**	3	<3.77	3.77-4.52	4.53-5.27	>5.27
% Chironomidae	**21.26**	1	0.79-4.10	4.11-9.48	9.49-16.19	<0.79 or >16.19
% Most Dominant Taxa (*Microcylleopus*)	**20.28**	4	<22.15	22.15-31.01	31.02-39.88	>39.88
% Most Dominant FFG (Predator)	**30.37**	4	<36.50	36.50-45.30	45.31-54.12	>54.12
% Predators	**30.37**	2	4.72-15.20	15.21-25.67	25.68-36.14	<4.73 or >36.14
Ratio Intolerant (<6) /Tolerant (≥6)	**0.81**	1	>4.79	3.21-4.79	1.63-3.20	<1.63
% Trichoptera as Hydropsychidae	**28.74**	3	<25.50	25.51-50.50	50.51-75.50	>75.50 or none
# Non-insect Taxa	**7**	4	>5	4-5	2-3	<2
% Collector-Gatherers	**29.20**	3	8.00-19.23	19.24-30.46	30.47-41.68	<8.00 or >41.68
% Elmidae	**23.43**	2	0.88-10.04	10.05-20.08	20.09-30.12	<0.88 or >30.12
Aquatic Life Use Designation	**HIGH**	34				
Exceptional	>36					
High	29-36					
Intermediate	22-28					
Low	<22					

Low Flow, Lower Reach

Metric	Value	Score	4	3	2	1
Taxa Richness	**35**	4	>21	15-21	8-14	<8
# EPT	**8**	3	>9	7-9	4-6	<4
HBI	**4.98**	2	<3.77	3.77-4.52	4.53-5.27	>5.27
% Chironomidae	**42.10**	1	0.79-4.10	4.11-9.48	9.49-16.19	<0.79 or >16.19
% Most Dominant Taxa (Chironominae)	**27.56**	3	<22.15	22.15-31.01	31.02-39.88	>39.88
% Most Dominant FFG (Predator)	**29.43**	4	<36.50	36.50-45.30	45.31-54.12	>54.12
% Predators	**29.43**	2	4.72-15.20	15.21-25.67	25.68-36.14	<4.73 or >36.14
Ratio Intolerant (<6) /Tolerant (≥6)	**0.55**	1	>4.79	3.21-4.79	1.63-3.20	<1.63
% Trichoptera as Hydropsychidae	**13.86**	4	<25.50	25.51-50.50	50.51-75.50	>75.50 or none
# Non-insect Taxa	**7**	4	>5	4-5	2-3	<2
% Collector-Gatherers	**28.71**	3	8.00-19.23	19.24-30.46	30.47-41.68	<8.00 or >41.68
% Elmidae	**5.74**	4	0.88-10.04	10.05-20.08	20.09-30.12	<0.88 or >30.12
Aquatic Life Use Designation	**HIGH**	35				
Exceptional	>36					
High	29-36					
Intermediate	22-28					
Low	<22					

Blanco River: Macroinvertebrates Community Metrics and ALU Designation

Table Blanco.1: Macroinvertebrate community composition also differed dramatically between reaches. Using the TCEQ Multimetric Index, the lower reach was deemed "High" in terms of the Aquatic Life Use (ALU) Designation based on macroinvertebrate communities during April 2019. However, this result seems dubious because the density of macroinvertebrates at the lower reach during the April algal bloom was abnormally high, approaching 100,000 individuals/m^2, and this was driven almost entirely by taxa that are typically associated with organic pollution and wastewater discharges (See next figure).

High flow, Upper reach.

Metric	Value	Score	4	3	2	1
Taxa Richness	30	4	>21	15-21	8-14	<8
# EPT	13	4	>9	7-9	4-6	<4
HBI	4.78	3	<3.77	3.77-4.52	4.53-5.27	>5.27
% Chironomidae	6.27	3	0.79-4.10	4.11-9.48	9.49-16.19	<0.79 or >16.19
% Most Dominant Taxa (*Baetis*)	31.75	2	<22.15	22.15-31.01	31.02-39.88	>39.88
% Most Dominant FFG (SCR)	31.44	4	<36.50	36.50-45.30	45.31-54.12	>54.12
% Predators	15.44	3	4.72-15.20	15.21-25.67	25.68-36.14	<4.73 or >36.14
Ratio Intolerant (<6) /Tolerant (≥6)	1.76	2	>4.79	3.21-4.79	1.63-3.20	<1.63
% Trichoptera as Hydropsychidae	56.96	2	<25.50	25.51-50.50	50.51-75.50	>75.50 or none
# Non-insect Taxa	6	4	>5	4-5	2-3	<2
% Collector-Gatherers	28.41	3	8.00-19.23	19.24-30.46	30.47-41.68	<8.00 or >41.68
% Elmidae	3.33	4	0.88-10.04	10.05-20.08	20.09-30.12	<0.88 or >30.12
Aquatic Life Use Designation	EXCEPTIONAL	38				
Exceptional	>36					
High	29-36					
Intermediate	22-28					
Low	<22					

High flow, Lower Reach

Metric	Value	Score	4	3	2	1
Taxa Richness	28	4	>21	15-21	8-14	<8
# EPT	7	3	>9	7-9	4-6	<4
HBI	6.51	1	<3.77	3.77-4.52	4.53-5.27	>5.27
% Chironomidae	5.23	3	0.79-4.10	4.11-9.48	9.49-16.19	<0.79 or >16.19
% Most Dominant Taxa (*Physella*)	40.42	1	<22.15	22.15-31.01	31.02-39.88	>39.88
% Most Dominant FFG (SCR)	63.30	1	<36.50	36.50-45.30	45.31-54.12	>54.12
% Predators	5.81	4	4.72-15.20	15.21-25.67	25.68-36.14	<4.73 or >36.14
Ratio Intolerant (<6) /Tolerant (≥6)	0.74	1	>4.79	3.21-4.79	1.63-3.20	<1.63
% Trichoptera as Hydropsychidae	6.98	4	<25.50	25.51-50.50	50.51-75.50	>75.50 or none
# Non-insect Taxa	11	4	>5	4-5	2-3	<2
% Collector-Gatherers	25.91	3	8.00-19.23	19.24-30.46	30.47-41.68	<8.00 or >41.68
% Elmidae	0.16	1	0.88-10.04	10.05-20.08	20.09-30.12	<0.88 or >30.12
Aquatic Life Use Designation	HIGH	30				
Exceptional	>36					
High	29-36					
Intermediate	22-28					
Low	<22					

Blanco River: Diatom Species Community Metrics

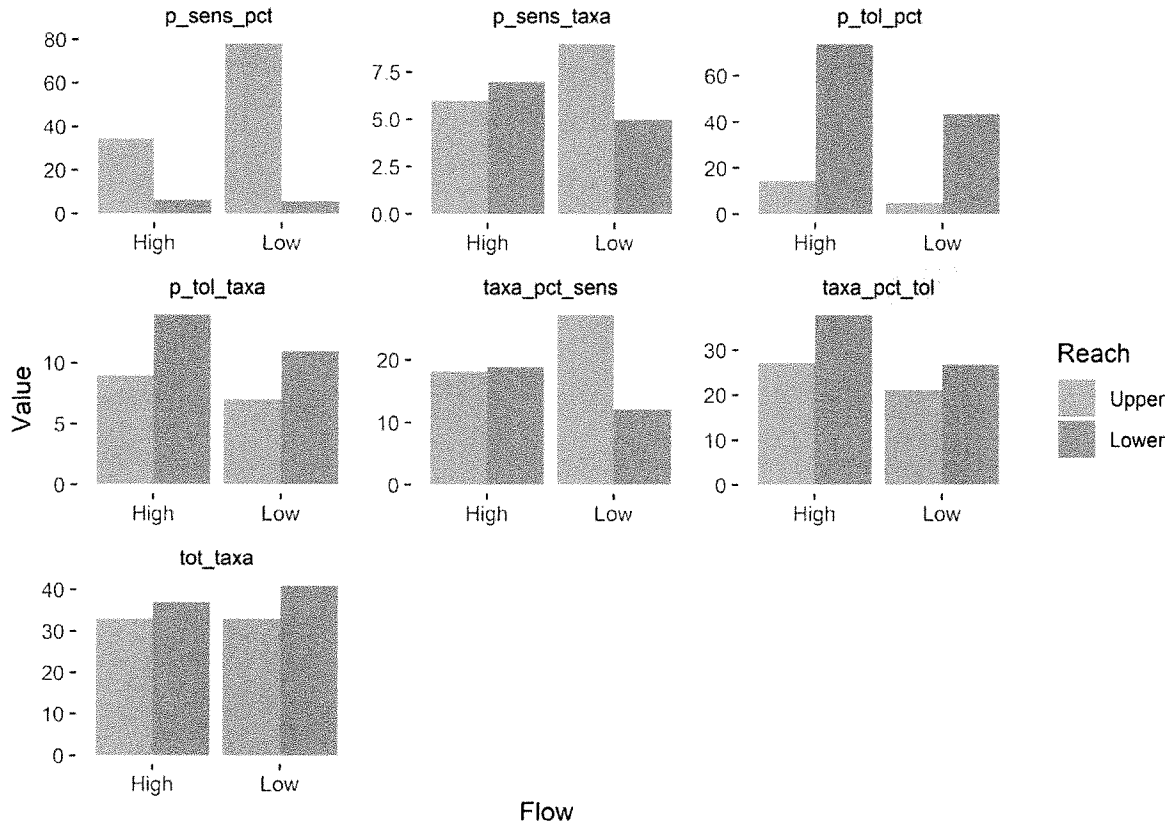


Figure Blanco.8: Diatom species composition also revealed substantial differences between the two reaches. The percentage of phosphorus (P) sensitive taxa richness and abundance was much higher at the upper reach, whereas the lower reach had large numbers of P-tolerant taxa. Diatoms are very sensitive to P enrichment, so this finding strongly implies that the lower reach was receiving excessive P enrichment from a source not found at the upper reach.

Blanco River: *Cladophora glomerata* (Nuisance Filamentous Green Alga) and Total Soft Algal Biovolume

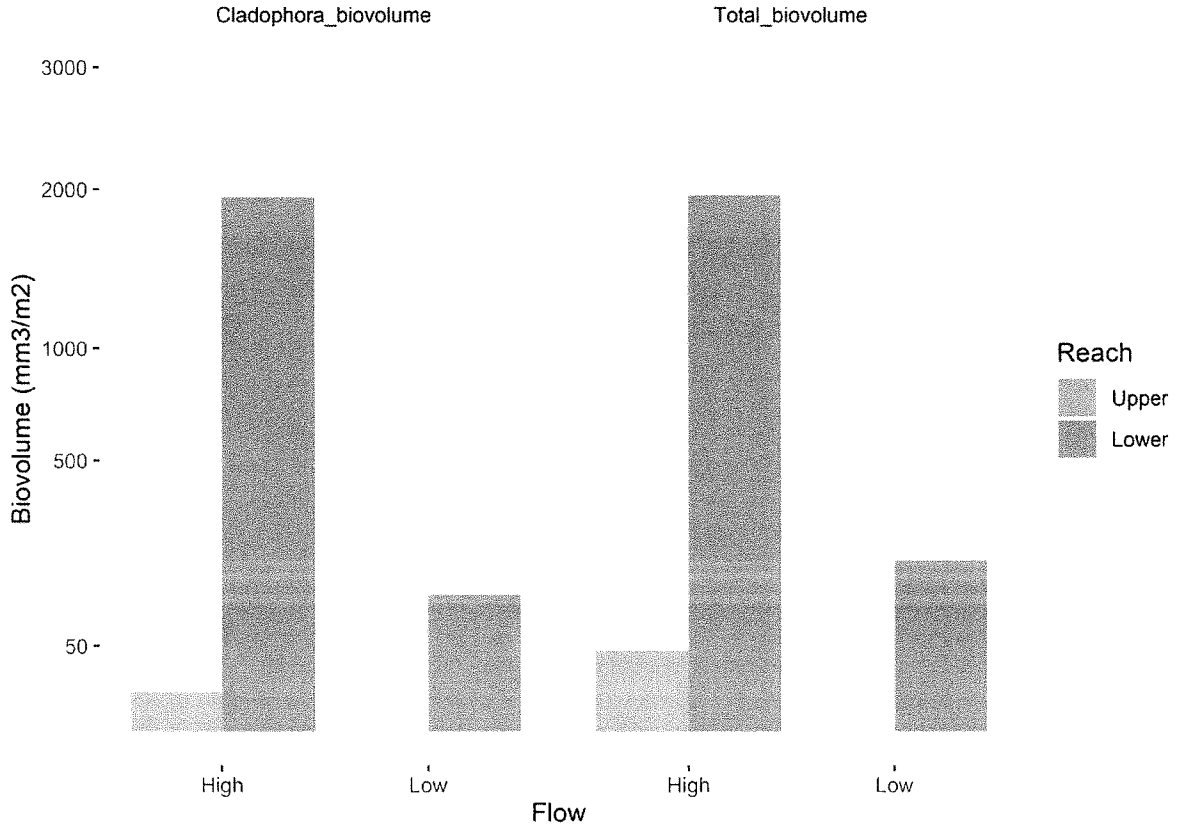


Figure Blanco.7: Biomass of Cladophora glomerata, the most common nuisance filamentous green algal species associated with excessive nutrient enrichment, was quite high during the early, high flow event at the lower reach, again consistent with nutrient enrichment from wastewater. Cladophora proliferates near wastewater discharges, and this result implies that wastewater was likely causing the blooms observed at the lower reach during April 2019. During the latter, low-flow event in August, moderate levels of Cladophora biovolume were identified at the lower reach whereas ***none*** *was found at the upper reach.*

Lori Rowe

From: PUBCOMMENT-OCC
Sent: Tuesday, April 12, 2022 11:41 AM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: WQ0015918001 TRPA comments 3
Attachments: ACFrOgBPypPqLx5W8VHGrsV2icY_nss1Y1yRpg-89oHr3jUi5nlxqgfANF2r_K5V_v5CjteGxkGqrEhhT70jufwEiEfH8ozt4M9idLckvAeJ2ZFWVIijzFrK2QRKKC8=.pdf

From: CHIEFCLK <chiefclk@tceq.texas.gov>
Sent: Tuesday, April 12, 2022 8:20 AM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: FW: WQ0015918001 TRPA comments 3

From: David Price <david@texasonsite.com>
Sent: Monday, April 11, 2022 8:22 PM
To: CHIEFCLK <chiefclk@tceq.texas.gov>; dpaustex@gmail.com; Tom Goynes <tomgoynes@mac.com>; David Price <dprice@texasonsite.com>
Subject: WQ0015918001 TRPA comments 3

TCEQ:

Texas Rivers Protection Association hereby submits the report on several sewage treatment plants, and resulting degradation of the associated rivers.

We object phosphorous limits beyond 20 ppm.

We would support a ZERO DISCHARGE permit.

David Price, P.E.
Manager
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Austin, TX 78755
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State of Texas Registered Engineering Firm F-5636

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Member - One Water Alliance
President - Texas Rivers Protection Association

Laurie Gharis
Chief Clerk
Texas Commission on Environmental Quality
P.O. Box 13087 – MC 105
Austin, Texas 787011 – 3087

April 11, 2022

Via: Online Submission Form

RE: Comments on the Application and Draft Permit of Walton Texas, LP for Proposed TPDES Permit No. WQ0015918001.

Dear Ms. Gharis:

These comments are submitted on behalf of the San Marcos River Foundation (SMRF) and the Texas River Protection Association (TRPA), regarding the Application and Draft Permit of Walton Texas, LP, for proposed TPDES Permit No. WQ0015918001.

Walton Texas, LP has applied for a new discharge permit, proposed TPDES Permit No. WQ0015918001 ("the Draft Permit"), to authorize wastewater discharge at a volume not to exceed 420,000 gallons per day in the final stage. The Applicant proposed to construct a new wastewater treatment plant, the Cotton Center Martindale Wastewater Treatment Facility. The draft permit would allow the discharge of treated effluent into Hemphill Creek, thence to Morrison Creek, thence to the Lower San Marcos River in Segment No. 1808 of the Guadalupe River Basin.

SMRF is a non-profit organization that was established to protect public access to and to preserve the San Marcos River. More specifically, SMRF works to protect the flow of aquifer fed springs into the San Marcos River, improve the water quality of the river, and protect the beauty of the river and nearby parks. A large part of SMRF's work involves water quality monitoring and scientific studies aimed at improving the quality of effluent discharged from wastewater facilities.

TRPA is a non-profit organization whose mission is to protect public access and preserve the flow, water quality, and natural beauty of the rivers of Texas, including the San Marcos and Guadalupe Rivers. TRPA sponsors river clean-ups, engages in public outreach and education to its members and the public concerning preservation of water quality of Texas rivers and streams, and participate in wastewater permitting cases.

Both SMRF and TRPA are concerned about the impacts that the Draft Permit will have on the water quality of the receiving waters, most notably the San Marcos River, and the impacts that the Draft Permit will have on their members and others who enjoy the river. Many of these concerns stem from the high levels of nutrient pollution permitted in the Draft Permit and the impacts that this will have on water quality, wildlife, and the ability of SMRF and TRPA members to continue using the receiving waters as they do now. The algae, odor, harm to aquatic and terrestrial wildlife, and increased turbidity of the receiving waters from the proposed discharge would harm the interests of SMRF, TRPA, and their members.

In these comments, SMRF and TRPA highlight some of the ways, in addition to the inaccurate information and discrepancies in the Application regarding the current conditions of the receiving waters, that the Application and Draft Permit for proposed TPDES Permit No. WQ0015918001 violate applicable TCEQ regulations and leave the receiving waters at high risk from nutrient pollution and other hazards.

I. THE DRAFT PERMIT WILL NEGATIVELY IMPACT SURFACE AND GROUNDWATER.

Elevated levels of Carbonaceous Biochemical Oxygen Demand (CBOD), Total Suspended Solids (TSS), nitrogen and phosphorus from treated wastewater, like the levels allowed in the Draft Permit, causes increased algal growth, proliferation of cyanotoxins, and increased murkiness in water. U.S. ENVIRONMENTAL PROTECTION AGENCY, A COMPILATION OF COST DATA ASSOCIATED WITH THE IMPACTS AND CONTROL OF NUTRIENT POLLUTION (2015). The discharge of pollutants allowed in the Draft Permit will impair water quality in the receiving waters, harm the existing biological communities, and impair any agricultural, fishing, and contact and noncontact recreation uses of the receiving waters. Further, SMRF and TRPA are particularly concerned by the high levels of total phosphorus in the wastewater effluent permitted in the Draft Permit given the well documented detrimental impacts associated with increasing phosphorus levels in a phosphorus limited ecosystems.[1] The harmful impacts associated with the pollution from the Draft Permit are of great concern since the receiving waters of Hemphill Creek are often in low or no flow conditions, exacerbating the harmful impacts of the pollution.

The Draft Permit will allow wastewater sewage containing high levels of nutrients and other pollutants to be discharged into the San Marcos River, impairing the uses of the iconic Texas river. The San Marcos River is an important feature of the Texas Hill Country and currently supports active recreational use by thousands every day in summer, good fishing, and several water intakes for public and private water supplies. Use of the San Marcos River for fishing and recreation will be impaired with the increased nutrients, algae, odors, and spills that will occur if Draft Permit is issued. TCEQ needs to consider these negative impacts to surface water quality and how they will affect landowners and the recreational and tourism economy dependent upon an attractive and safe San Marcos River.

In addition to the negative impacts on the surface water downstream of the discharge, there is the strong possibility that groundwater will be contaminated once the wastewater discharge reaches the San Marcos River, as the San Marcos River crosses alluvial aquifers and seeps underground through gravel. Should this occur, the wastewater discharge would introduce bacteria and nitrogen into public and private wells in the area, creating a public health risk. Furthermore, the proposed wastewater treatment facility will be located on top of underground streams and flow into areas that sit atop underground streams, increasing the probability of groundwater contamination.

---

[1] U.S. Environmental Protection Agency, *Indicators: Phosphorus*, (last visited Apr. 11, 2022) https://www.epa.gov/national-aquatic-resource-surveys/indicators-phosphorus; USGS, *Phosphorus and Water*, (last visited Apr. 11, 2022) https://www.usgs.gov/special-topics/water-science-school/science/phosphorus-and-water.

Additionally, the wastewater effluent from the Draft Permit would flow near a hand-dug well from the 1800s that is used as a water source by adjacent landowners. Groundwater wells constructed prior to 1989, due to construction practices at the time, are particularly susceptible to contamination from surface water. Moreover, the City of Martindale has expressed concern that the wastewater effluent is likely to contaminate one or more groundwater wells used as a source for public drinking water. These wells are an important source of water, and the risk of contamination posed by the Draft Permit cannot be disregarded.

TCEQ cannot ignore the negative impacts that increased pollutants, including phosphorus, will have on the surface water and groundwater downstream of the wastewater discharge.

II. THE DRAFT PERMIT, IF ISSUED, MUST INCLUDE MORE STRINGENT POLLUTION PARAMETERS.

The Draft Permit must include a more stringent pollution parameter for total phosphorus and include a limit on total nitrogen in order to protect human health and the health of wildlife.

In the current Draft Permit, TCEQ is only requiring an effluent quality of 5 mg/L CBOD, 5 mg/L TSS, 2 mg/L Ammonia Nitrogen, and 1 mg/L Total Phosphorus in the final phase of the Draft Permit. The Draft Permit, if issued, should set limits on these pollutants at levels no less stringent than 5-5-2-0.5 for all phases of the discharge.[2] However, even more stringent effluent levels are achievable and should be in place to better protect wildlife and human health. A 2007 report by the U.S. Environmental Protection Agency (EPA), the agency found that wastewater treatment plants are capable of treating wastewater to reduce total phosphorus levels below .5 mg/L. U.S. EPA, ADVANCED WASTEWATER TREATMENT TO ACHIEVE LOW CONCENTRATION OF PHOSPHORUS (2007). Moreover, the impacts from increased phosphorus can be eliminated altogether with the implementation of a zero-discharge system.

In addition to more stringent effluent limitations, the Draft Permit also needs to include a limit on total nitrogen to adequately protect against adverse ecological and human health effects. Although the Draft Permit has a limit on ammonia nitrogen, studies show that this is not an effective surrogate for controlling other forms of nitrogen in wastewater, including nitrates. Exposure to nitrates in humans can lead to a potentially fatal condition in infants known as blue baby syndrome, and exposure to nitrates in livestock and wildlife can lead to nitrate toxicity. Moreover, the EPA has set maximum contaminant levels for nitrates in drinking water at 10 mg/L. Although potable water suppliers are responsible for treating drinking water to the applicable standards, recreational users of the receiving waters, including the San Marcos River, may ingest raw water unintentionally or humans might be exposed by drinking water from groundwater wells drawn from alluvial aquifers.

Since the negative ecological and human health impacts of phosphorus enrichment and nitrogen pollution of the receiving waters can be mitigated through more stringent, yet achievable, standards or by using a zero-discharge system, the Draft Permit, if issued, must

[2] 5-5-2-0.5 is a shorthand referenced for effluent parameters of 5 mg/L CBOD, 5 mg/L TSS, 2 mg/L Ammonia Nitrogen, and 0.5 mg/L Total Phosphorus.

include a more stringent phosphorus limit and impose a limit on total nitrogen or instead require the use of a zero-discharge system.

III. THE DRAFT PERMIT, IF ISSUED, SHOULD INCLUDE PROVISIONS THAT REQUIRE THE REUSE OF EFFLUENT.

Setting more stringent treatment standards would support the inclusion of a re-use provision in the Draft Permit. The higher quality treated wastewater can be sold for irrigation or industry, making it a valuable commodity for Walton Texas, LP. For example, treated wastewater can also be reused in landscape irrigation, gray water systems, and cooling towers, and presents a much better option than groundwater. There are many other uses for good quality treated wastewater, uses better than polluting the San Marcos River. With water prices skyrocketing and demand for water rising steeply, including a reuse provision in the Draft Permit would be a win-win to meet the growing demand for treated wastewater and lessen the impacts of wastewater pollution in the San Marcos River. Furthermore, the City of Martindale has asked that any wastewater treatment facilities not complying with their regionalization plan reuse at least 75% of their treated wastewater. Having good quality wastewater, a small lake for storing some of it, and a re-use provision in the Draft Permit, if issued, will make treated wastewater a valuable commodity for Walton Texas, LP, while also helping to protect those downstream of the wastewater treatment plant.

IV. THE DRAFT PERMIT WILL CAUSE ODORS AND OTHER IMPACTS TO NEARBY NEIGHBORS.

The Walton Texas, LP has not shown that the proposed wastewater treatment facility will adequately protect against nuisance odors. In addition to odors from the operation of the proposed wastewater treatment plant, the nutrients from the wastewater effluent will cause the receiving waters to be choked with odor-causing algae, especially in the warmer months, since there is little shade along the small tributaries that run into the San Marcos River, which will at times be mostly or totally wastewater. The odors from the algae will harm the adjacent landowners' ability to use and enjoy their property and violates TCEQ's water quality standards regarding aesthetic parameters. 30 T.A.C. § 307.4.

In addition to odor impacts, the Draft Permit will also increase the flow in the receiving waters, particularly Hemphill Creek and Morrison Creek, to levels that will impede adjacent landowners' access to their property. The discharge allowed by the Draft Permit will also increase the likelihood that adjacent landowners' property will be flooded and their property destroyed. The Draft Permit will also contaminate groundwater that adjacent landowners and the City of Martindale depend on through the ordinary course of its operation and in flood events. The high levels of nitrates, high levels of chlorine, and the increased algal growth due to the wastewater effluent will also impact adjacent landowners' use of the receiving waters to water their livestock and use the receiving waters for fishing and contact recreation uses. Neighboring landowners will also be subjected to increased light pollution and traffic as a result of the proposed wastewater treatment plant.

The Draft Permit and proposed wastewater treatment plant will harm nearby neighbors through odors, flooding, and impairment of current uses of the receiving waters. TCEQ cannot approve this Draft Permit, particularly when it comes at such a high cost to those living nearby.

V. THE PROPOSED DISCHARGE IS NOT PROTECTIVE OF WILDLIFE.

The Draft Permit poses significant risk to aquatic and terrestrial wildlife. In addition to the risks associated with increased algal blooms and cyanotoxins, wildlife is at risk from the impacts linked with excessive nitrate consumption. Isaza et al., *Living in Polluted Waters: A Meta-Analysis of the Effects of Nitrate and Interactions with Other Environmental Stressors on Freshwater Taxa*, 261 ENVIRONMENTAL POLLUTION 1 (2020). Moreover, the Draft Permit, if issued, should require the wastewater treatment plant to treat wastewater with UV disinfection as the chlorine disinfection authorized by the Draft Permit has been found to be toxic to wildlife. The risks posed to aquatic and terrestrial wildlife by the Draft Permit are significant, and TCEQ has failed to fully evaluate them.

The wildlife in the San Marcos River continues to require high-quality, clear water. Wildlife such as otters, fish, sensitive mussels, benthic creatures, and other invertebrates need clean water to survive and reproduce. Additionally, the Comal Springs Riffle Beetle, Texas Blind Salamander, San Marcos Salamander, and the Fountain Darter, all endangered species, can be found in the impacted segment of the San Marcos River and require high-quality clear water in order to recover. Further, several Texas freshwater mussel species found in the San Marcos River, are currently being considered for listing under the Endangered Species Act and are currently listed as threatened under Texas state law. To avoid or minimize adverse impacts to the aquatic and terrestrial wildlife dependent on the San Marcos River, the Draft Permit, if issued, must include more stringent effluent requirements and consider increasing dissolved oxygen to protect aquatic life uses or include reuse provisions.

VI. THE PROPOSED WASTEWATER TREATMENT FACILITY DOES NOT ADDRESS FLOODING.

Walton Texas, LP has not demonstrated that the proposed wastewater treatment facility is protected from a 100-year flood, and the Draft Permit provides no specific requirements for protecting the facility from a 100-year flood. Adjacent landowners are aware that the proposed wastewater treatment facility is located in a flood plain that is prone to flooding and that there have been no improvements in drainage or flood management in the area that would make it safe for the proposed wastewater treatment facility to be built in the currently proposed location. As is, the proposed wastewater treatment facility poses high risks of sewage spills and leaks due to flood events. Landowners adjacent to the discharge point are also aware of the fact that Hemphill Creek is prone to flooding and can lead to conditions that imperil human life. This oversight leaves nearby landowners and wildlife at risk to hazards and spills of wastewater that are likely to occur in the event of a 100-year flood in the area.

VII. THE APPLICANT HAS NOT DEMONSTRATED A NEED FOR THE DISCHARGE OR COMPLIANCE WITH THE STATE'S REGIONALIZATION POLICY.

State policy encourages and promotes the development and use of regional and area-wide waste collection, treatment, and disposal systems to prevent pollution and maintain and enhance the quality of water in the state. Tex. Water Code § 26.801(a). When considering whether to issue a discharge permit, TCEQ must consider the need for the permit and the availability of existing or proposed regional waste collection, treatment, and disposal systems. Walton Texas, LP has not demonstrated why it needs its own permit and cannot tie into existing wastewater treatment infrastructure and participate in regionalization plans already in place.

In fact, the City of Martindale is actively considering and developing a regional wastewater facility plan to limit harmful wastewater discharges in the San Marcos River while still accommodating growth in the area. Furthermore, the City of Martindale has criticized the Draft Permit and the proposed wastewater treatment facility for not complying with the City's wastewater regionalization plans and for violating the development agreement between the City and the developer because the effluent discharge allowed under the Draft Permit will harm the environment, humans, and wildlife. TCEQ should not ignore the City of Martindale's request to deny the Draft Permit based on regionalization and environmental concerns.

For the above reasons, SMRF and TRPA oppose the proposed TPDES Permit No. WQ0015918001 and ask that the Application for WQ0015918001 be denied. To summarize, SMRF and TRPA emphasize and urge TCEQ to amend the Draft Permit to require, at a minimum, 5-5-2-0.5 as the permit parameters, encourage as much reuse of the wastewater as possible, and consider the critical issue of nutrients negatively affecting the uses of the San Marcos River, including recreation, wildlife, and public water supply. SMRF and TRPA believe that more stringent effluent limitations or a zero-discharge system would alleviate many of the issues mentioned in the previous sections. A zero-discharge system would allow the treated wastewater to stay on the site of the development to be put to beneficial use for the subdivision, including, reuse, landscape irrigation, potential dual piped systems to homes, and other beneficial uses rather than allowing the treated sewage to pollute the waters of the San Marcos River.

Thank you for considering SMRF's and TRPA's comments and for holding a public meeting to allow the impacted community to learn more and express their concerns about the Draft Permit.

Sincerely,

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Lori Rowe

From: PUBCOMMENT-OCC
Sent: Tuesday, April 12, 2022 11:52 AM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: Public comment on Permit Number WQ0015918001

From: president@txrivers.org <president@txrivers.org>
Sent: Monday, April 11, 2022 7:33 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number WQ0015918001

REGULATED ENTY NAME COTTON CENTER MARTINDALE WWTP

RN NUMBER: RN111097283

PERMIT NUMBER: WQ0015918001

DOCKET NUMBER:

COUNTY: CALDWELL

PRINCIPAL NAME: WALTON TEXAS LP

CN NUMBER: CN604017491

FROM

NAME: David Price PE

EMAIL: president@txrivers.org

COMPANY: Texas Rivers Protection Association

ADDRESS: 444 PECAN PARK DR
SAN MARCOS TX 78666-8544

PHONE: 5126987676

FAX:

COMMENTS: Texas Rivers Protection Association submits the link to the following report, and wants the report, IN FULL as part of the comments. This regards nutrient studies on similar rivers, that show the detriments of phosphorous above 20 MICROGRAMS per liter. . The applicant is submitting a permit at 1.0 GRAMS per liter, which is over 50 times the levels at which major nuisance algae levels occurs. Please see the links: https://wimberleywatershed.org/wp-content/uploads/2020/10/DrRyanKing_final_report_from_baylor_university_to_sosa_final_10.23.20.pdf

https://wimberleywatershed.org/wp-content/uploads/2020/08/KingRS_BlancoCityCouncil_Public_Comment_Aug_2020.pdf

Lori Rowe

From: PUBCOMMENT-OCC
Sent: Tuesday, April 12, 2022 11:54 AM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: Public comment on Permit Number WQ0015918001
Attachments: KingRS_BlancoCityCouncil_Public_Comment_Aug_20202.pdf

From: president@txrivers.org <president@txrivers.org>
Sent: Monday, April 11, 2022 7:22 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number WQ0015918001

REGULATED ENTY NAME COTTON CENTER MARTINDALE WWTP

RN NUMBER: RN111097283

PERMIT NUMBER: WQ0015918001

DOCKET NUMBER:

COUNTY: CALDWELL

PRINCIPAL NAME: WALTON TEXAS LP

CN NUMBER: CN604017491

FROM

NAME: David Price PE

EMAIL: president@txrivers.org

COMPANY: Texas Rivers Protection Association

ADDRESS: 444 PECAN PARK DR
SAN MARCOS TX 78666-8544

PHONE: 5126987676

FAX:

COMMENTS: Texas Rivers Protection Association, TRPA, is a non-profit that has a 32 year history regarding water quality in streams, rivers, and their dry branches. TRPA wishes to note that the San Marcos River is an iconic, stream fed river, which starts at the springs located on the campus of Texas State University. TSU has the Meadows Center, which uses the springs as a living classroom, studying water-related issues. The springs are also home to endangered species. The

introduction of phosphorous, in amounts greater than 20 ppm (20 MICROGRAMS PER LITER) result in nuisance algae growth (please see attached studies from Baylor University, Dr. King). This, in turn, reduces the total dissolved oxygen (DO) in the waters, potentially resulting in fish kills, and loss of benthic organisms. The above situation will result in eutrophic conditions on the river. The river is a major tourist attraction for the San Marcos area and is used for river recreation, in terms of canoeing, kayaking, paddleboarding, swimming, tubing, fishing, and other uses. Various studies (attached) have shown the actual impacts of shown what happens when phosphorous is introduced, above natural background levels, result in massive volumes of nuisance algae. We request that a zero discharge system be used, such as beneficial reuse. This could include crop use, landscaping, dust control, grey-water systems, and more. Drip irrigation is a major benefit and solution to discharge. Our President, David Price, PE, has designed and built many systems of this scale. He offers design assistance and guidance on this situation.

Baylor University

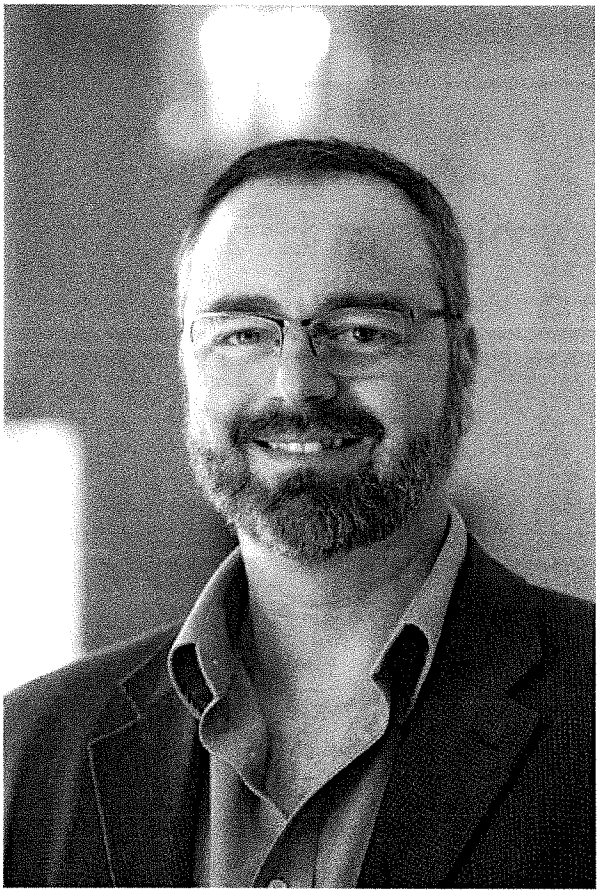
Nutrient and biological assessment of the Blanco River, 2019

Ryan S. King, Ph.D.

Professor and Graduate Program Director
Department of Biology
Center for Reservoir and Aquatic Systems Research
Baylor University, Waco, TX
www.baylor.edu/aquaticlab

Public comment prepared for Blanco City Council, August 2020

CRASR
Center for Reservoir & Aquatic Systems Research



Dr. Ryan S. King: Credentials

- PhD, Duke University, 2001
- Ecologist, Smithsonian Institution, 2001-04
- Professor (Full), Biology, Baylor University
- Outstanding Professor Award, Baylor, 2014
- Expert witness in 8 Federal cases involving environmental pollution
- Published ~100 journal articles and reports
- Research focused primarily on nutrient criteria in streams, with several projects in Texas and surrounding states

Nutrient criteria research in Texas

Linking observational and experimental approaches for development of numerical nutrient criteria for wadeable streams. 2009. Section 104(b)(3) Water Quality Cooperative Agreement #CP-966137-01 **U. S. EPA Region 6**, Dallas, TX.

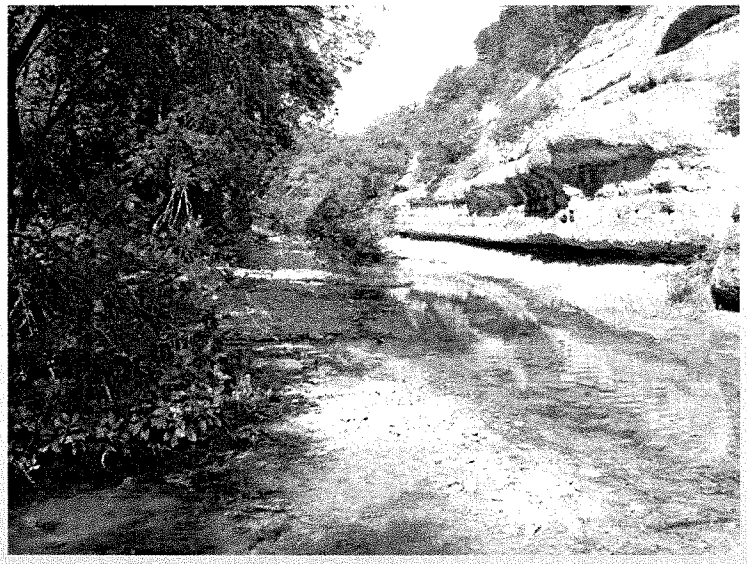
https://www.baylor.edu/content/services/document.php/95606.pdf

Development of biological indicators of nutrient enrichment for application in Texas streams. 2009. 106 Water Pollution Control Grant # 98665304, **Texas Commission on Environmental Quality**, Austin, TX.

https://www.baylor.edu/content/services/document.php/107739.pdf

Streams < 15 ug/L total phosphorus (TP)

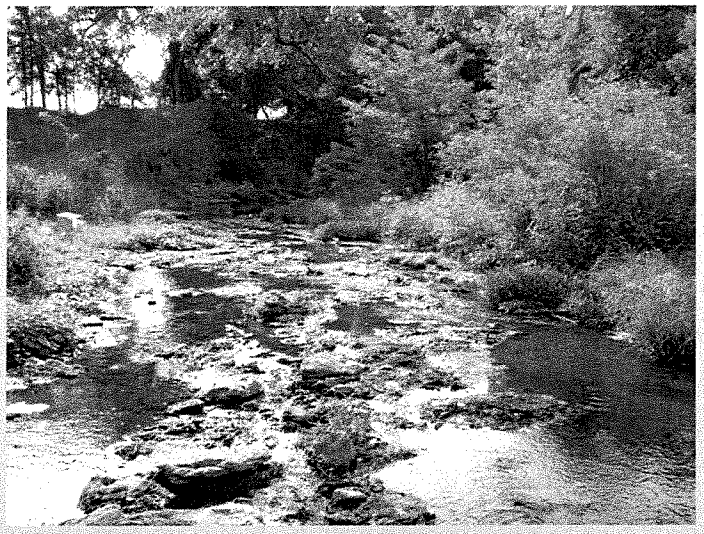
- Very low levels of nuisance filamentous green algae
- High dissolved oxygen
- Exceptional diatom and macroinvertebrate communities
- Exceptional fish communities



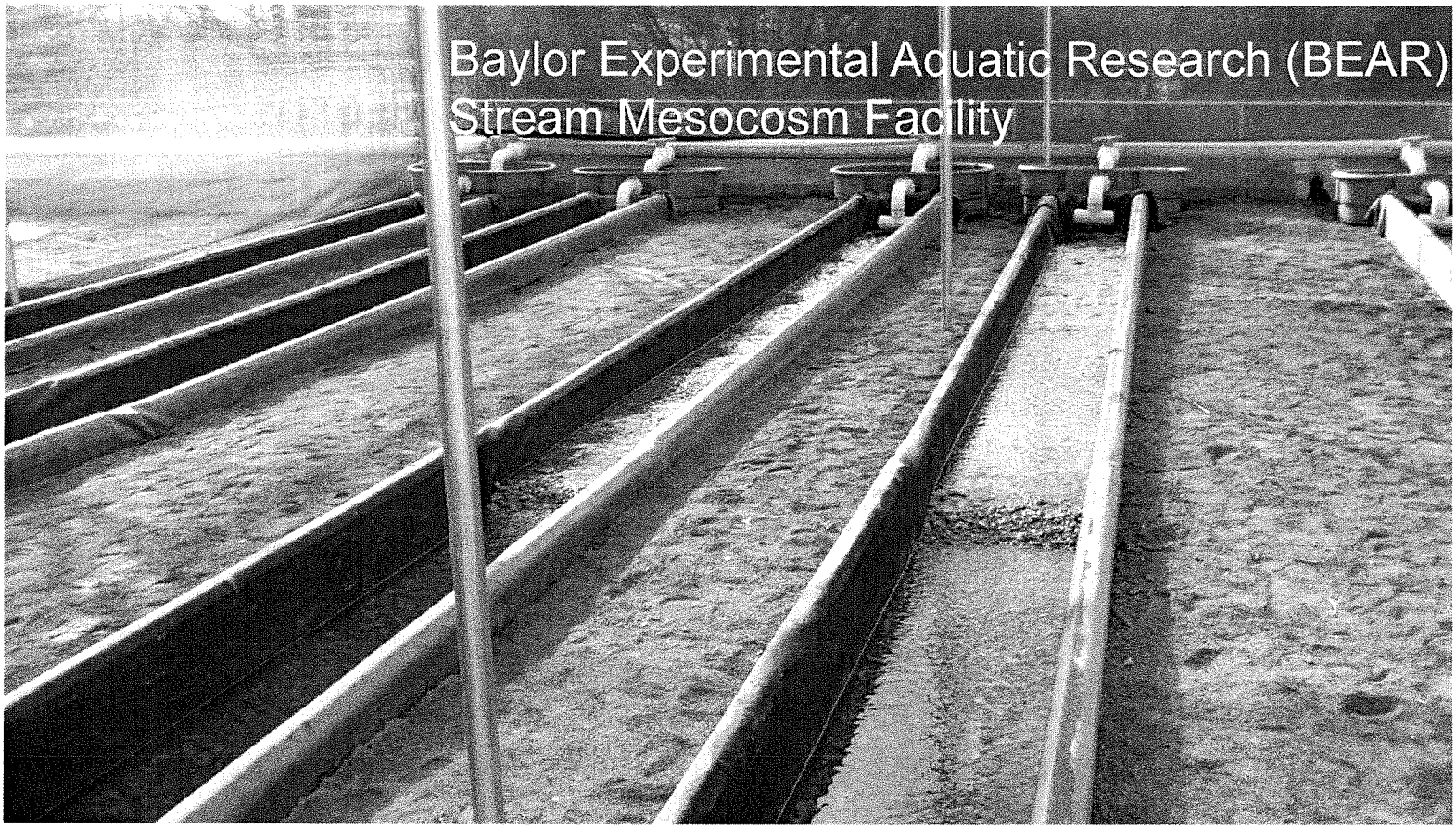
Salado Creek upstream of Salado, TX, 2008

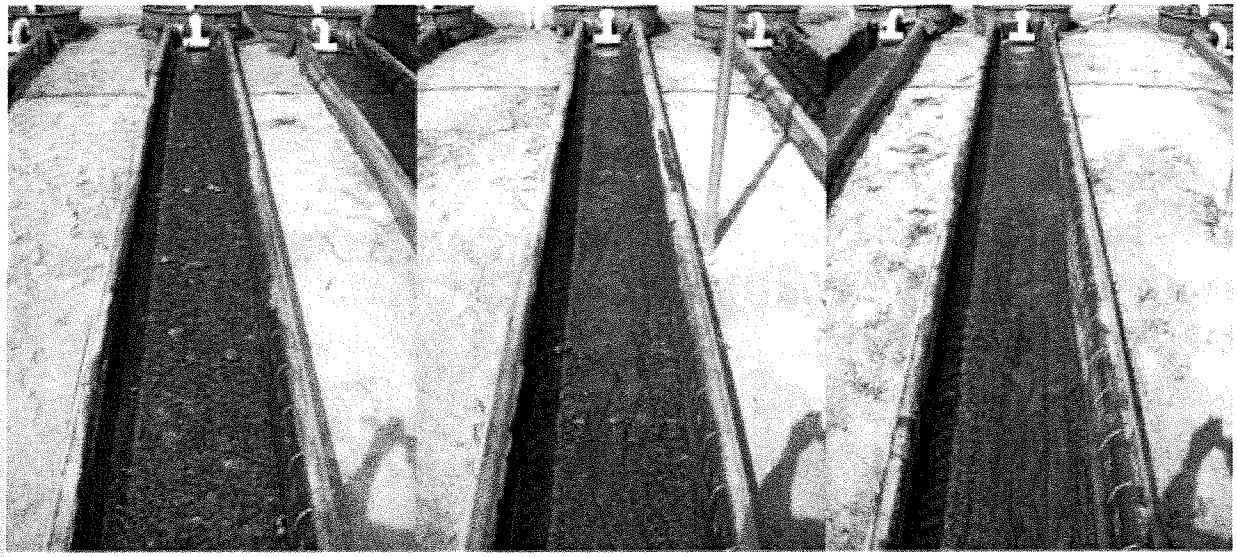
Streams > 20 ug/L total phosphorus

- High levels of nuisance filamentous green algae
- Low dissolved oxygen at night
- Diatom and macroinvertebrate communities typical of overenriched streams
- Fish communities dominated by carp, red shiners



North Bosque River near Stephenville, TX, 2008


Baylor Experimental Aquatic Research (BEAR)
Stream Mesocosm Facility

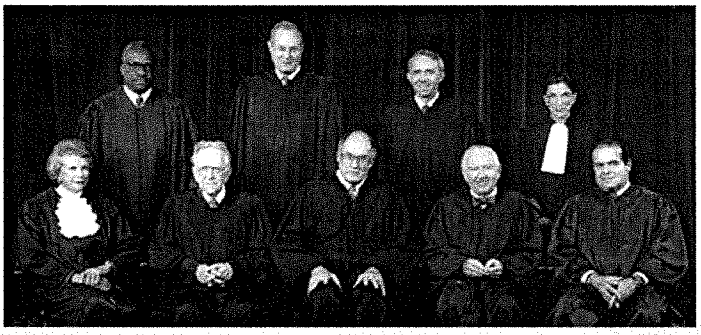


Experiment confirmed that >20 ug/L P caused nuisance algal growth

Cladophora=nuisance green algae

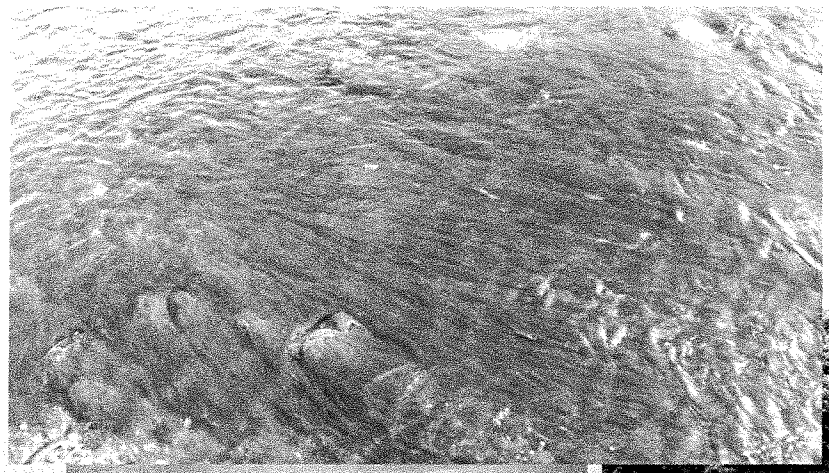
Other nutrient criteria research

- *Oklahoma-Arkansas Scenic Rivers Joint Phosphorus Study*. Final Report to the Governors from the Joint Study Committee and Scientific Professionals.
- Study based on landmark Supreme Court case
- After 30 years of litigation, this study resulted in unanimous support for a numeric P criterion



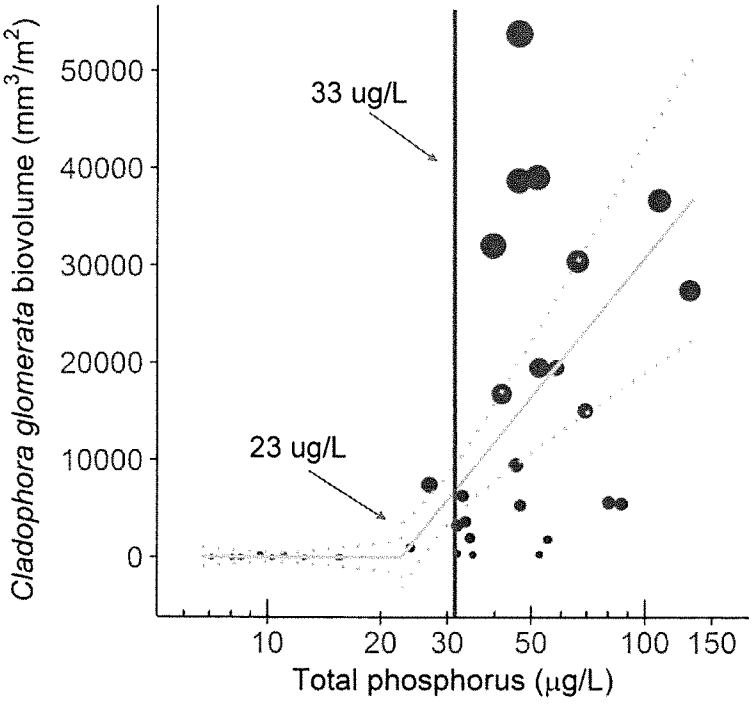
US Supreme Court, 1992

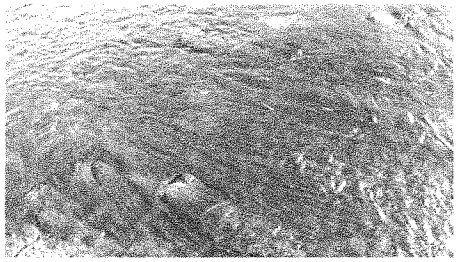
https://www.baylor.edu/aquaticlab/doc.php/302701.pdf



Oklahoma-Arkansas Joint Phosphorus Study focused on "nuisance algae"

Predominantly *Cladophora glomerata*





Segmented regression threshold: 23 ug/L

Threshold Indicator Taxa Analysis (TITAN) taxa threshold: 33 ug/L

Bottom line: Nuisance algae proliferated between **20 and 35 ug/L TP**, and was virtually absent below 15 ug/L TP.

This result is very similar to TX studies.

LIVE

75°
Austin, TX

LOCAL

Algae infestation is causing an upset among residents along the Blanco River

Residents near the Blanco River say the algae problem has gotten a lot worse in only a few week's time.

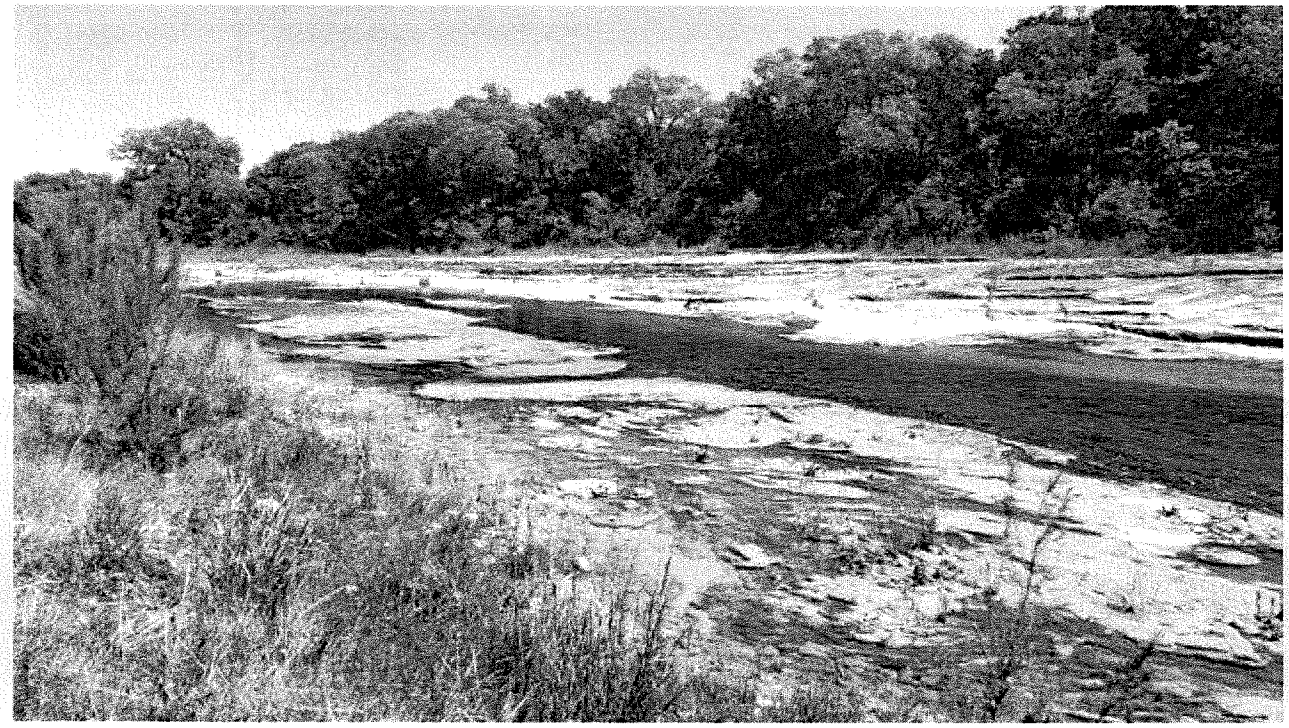
https://www.kvue.com/video/tech/science/environment/homeowners-concerned-about-algae-in-blanco-river/269-240853a9-276d-4af7-a8b3-3a0fde041950?jwsource=cl

Blanco River Study

- Two locations:
  - Upstream of City of Blanco, adjacent to Smith property on Goldwin-Smith Road
  - Downstream of 165 @ Blanco Settlement
- Sampling during early summer high flows (April-May) and late summer low flows (August-Sep)

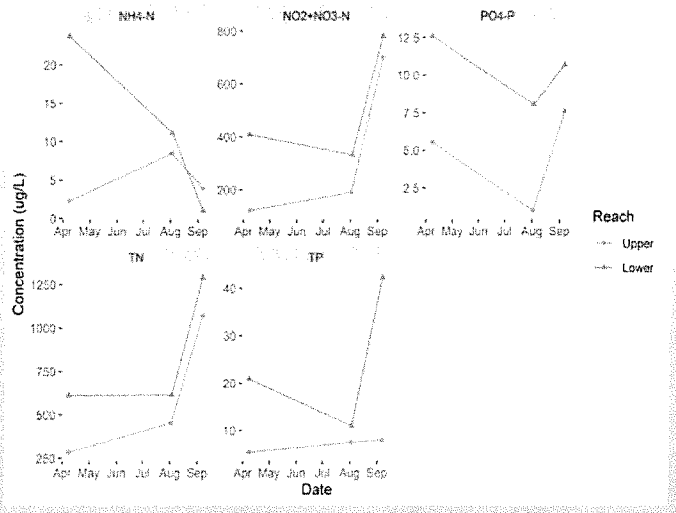
Blanco River at Goldwin-Smith Road, April 2019

Blanco River at Blanco Settlement, April 2019



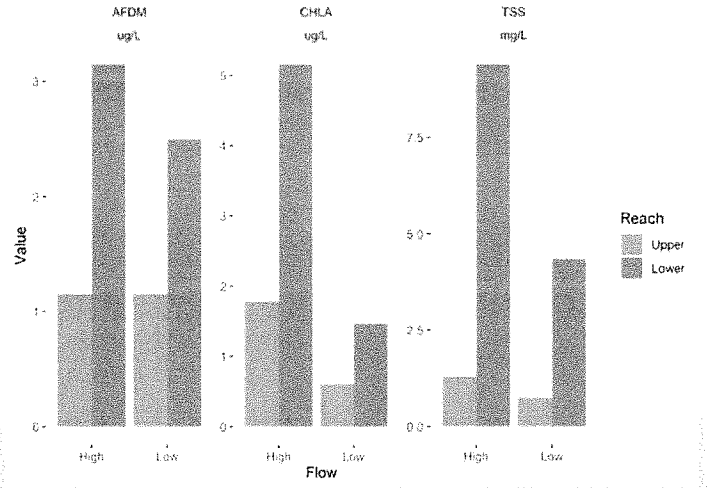
Blanco River: Nutrients

- Total phosphorus (TP) exceeded 20 ug/L April and over 40 ug/L during low flow (Sep) at lower reach
  - Note: These are levels that correspond to nuisance algal blooms in TX and OK/AR studies
- TP was always <10 ug/L at the upper reach
- Other nutrients also trended higher at lower reach



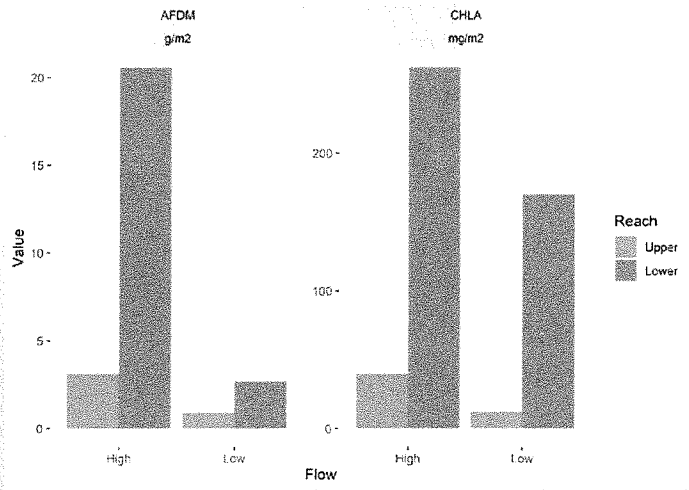
Blanco River: Particles in the Water

- Organic matter (AFDM), algal biomass (CHLA), and all types of particles (TSS) were always higher at the lower reach (Blanco Settlement) than the upper reach (Goldwin-Smith)
- The data suggest most of the cloudiness in the water at Blanco Settlement **was related to algae in the water**



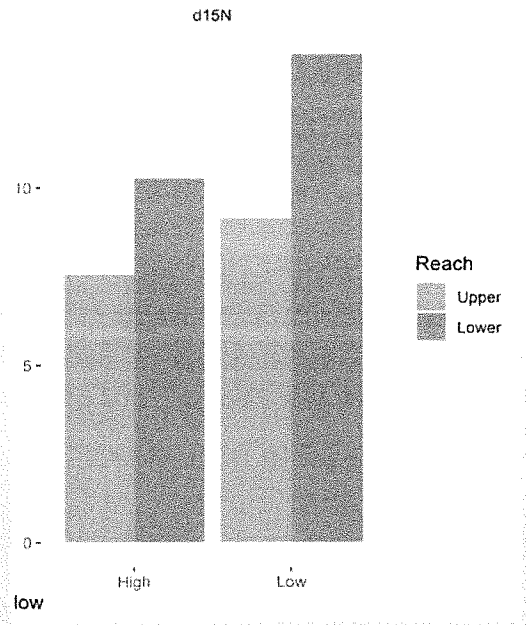
Blanco River: Algae on the Stream Bottom

- Total biomass of organic matter (AFDM) and algae biomass (CHLA) was several times greater at Blanco Settlement than at the upstream reference site **during both seasons.**
- The level of CHLA at Blanco Settlement during exceeded what is widely considered to be a threshold for nuisance levels of algae (150 mg/m2), which was evident from photographs and casual observation as well.



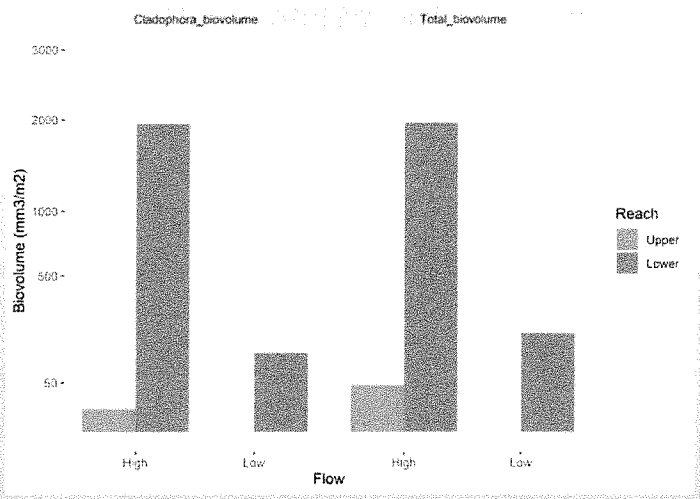
Blanco River: Nitrogen Isotopes in Algae

- d15N in algae is an indicator of SOURCES of nutrients. The higher the value, the more nitrogen is coming from municipal wastewater.
- d15N was markedly higher at Blanco Settlement when compared to the upstream site. Levels of d15N above 10 are highly indicative of wastewater, which was evident from both sampling events at the lower site.



Blanco River: Biovolume of Algae

- Biovolume is a way another way to estimate the amount of algae on the stream bottom.
- Barbara Winsborough, a world-class taxonomist, estimated biovolume for all species of algae from samples we collected from the stream bottom.
- *Cladophora*, the most common nuisance species of green algae, was many times more abundant at Blanco Settlement than at the upstream site.
- *Cladophora* contributed almost all of the biovolume of algae at the lower site.



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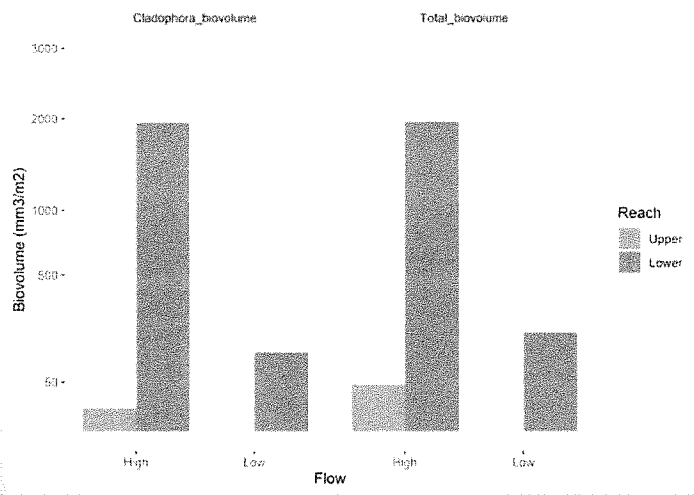
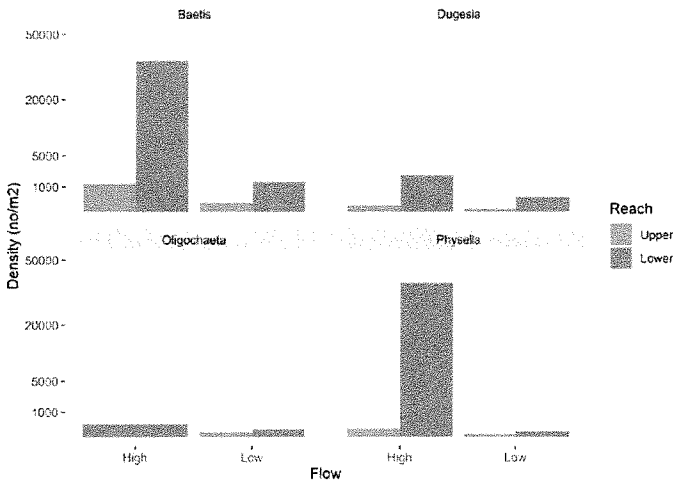


Blanco River: Macroinvertebrates

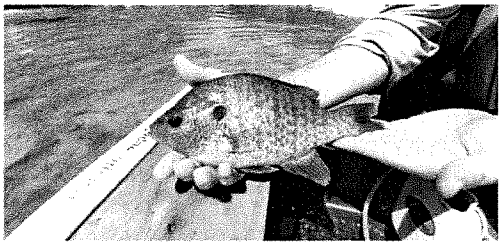
- Aquatic macroinvertebrates are key indicators of water quality
- We found that densities of macroinvertebrate taxa typically found near wastewater treatment effluent discharges were higher, sometimes many times higher, at Blanco Settlement than at the upstream site
- Overall densities of macroinvertebrates were several times higher at the lower site, but again, dominated by weedy taxa that are indicators of poor water quality

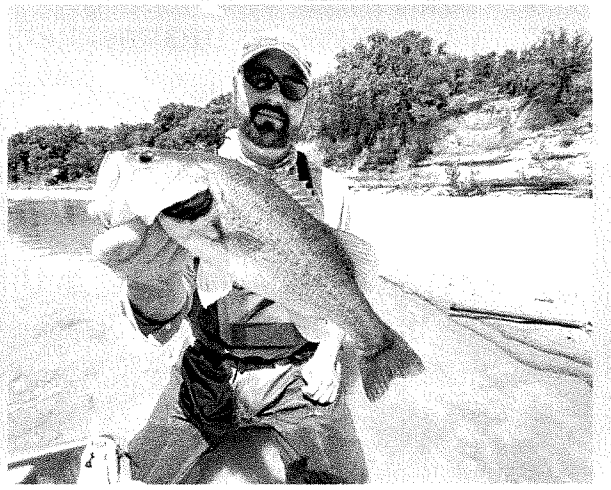


Baetis=tolerant mayfly
Dugesia=flatworm
Oligochaeta=segmented worm
Physella=lunged snail

Blanco River: Fish

- Fish were more abundant at Blanco Settlement, but dominated by stonerollers (a fish that eats algae), juvenile sunfish (longears, bluegill), and blacktail shiners.
- Fewer, but larger fish were collected at the Goldwin-Smith site, including redear sunfish and largemouth bass.



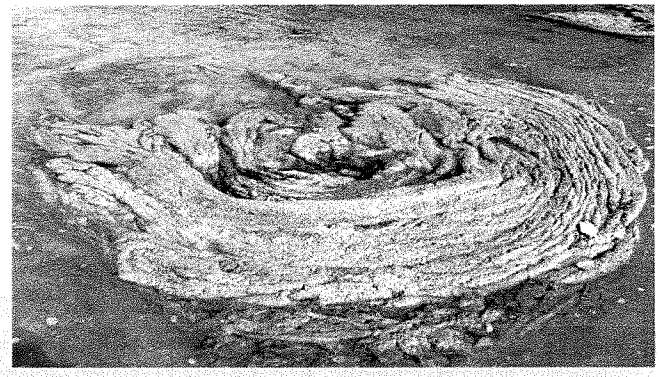


Summary

- Nutrients, esp phosphorus, were elevated at Blanco Settlement
- Nuisance algae was much more abundant at Blanco Settlement
- Nitrogen isotopes showed that nutrients were coming from wastewater at Blanco Settlement
- Macroinvertebrates associated with wastewater proliferated at Blanco Settlement
- Fish were dominated by small "baitfish" and juvenile sunfish at Blanco Settlement, whereas larger gamefish were found at upstream site.

Conclusion

- Blanco River study results consistent with multiple published research papers concluding that total phosphorus must be kept below 15 to 20 micrograms/L in order to protect native aquatic communities and prevent excessive algae growth



Massive aggregation of filamentous green algae (Cladophora) at Blanco Settlement, April 2019

REVIEWED
OCT 20 2021
By GCW PM

Regarding the Cotton Center Sewage Discharge into Hemphill Creek: Permit Number WQ0015918001

MWD
122210

Whereas Walton Texas LP has applied for a permit to discharge treated wastewater into Hemphill Creek, up to 420,000 gallons per day;

Whereas the proposed level of treatment in the draft TCEQ discharge permit is insufficient to protect the quality of the water in Hemphill Creek, thence to Morrison Creek, thence to the lower San Marcos River, and

Whereas there are families, livestock, and wildlife who will be adversely affected by this wastewater at that level of treatment, and

Whereas the Martindale Water Supply Corporation wellhead protection area could be adversely affected by this wastewater,

I, Rodney Purswell,
Signature

request a public meeting regarding this permit. And, I wish to be added to the mailing list on this permit, so I receive notices about further steps in this permit process.

Rodney Purswell
Name, printed clearly

3385 SE River Rd. Martindale, Tx. 78655
Address

806-274-1227 rpurswell2hotmail.com
Phone E-mail

Reasons that I am affected:

I have 16 acres on ~~the~~ Morrison Creek and 2 houses on that 16 acres it floods enough already

All public comments or public meeting requests must be submitted to the Office of the Chief Clerk, MC-105, Texas Commission on Environmental Quality, PO Box 13087,

Rodney Purswell
3385 SE River Rd.
Montgomery, Tx. 77356

AUSTIN TX 787
RIO GRANDE DISTRICT
26 OCT 2021 PM 3 L

2021
FOREVER / USA

RECEIVED
OCT 28 2021
TCEQ MAIL CENTER
CJ

Office of the Chief Clerk MC 105
Texas Commission on Environmental Quality
PO Box 13087
Austin, Tx 78711-3087

78711-308787

Lori Rowe

From: PUBCOMMENT-OCC
Sent: Monday, March 21, 2022 9:22 AM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: Public comment on Permit Number WQ0015918001

MWD
122210

From: saludhealingarts@gmail.com <saludhealingarts@gmail.com>
Sent: Sunday, March 20, 2022 5:37 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number WQ0015918001

REGULATED ENTY NAME COTTON CENTER MARTINDALE WWTP

RN NUMBER: RN111097283

PERMIT NUMBER: WQ0015918001

DOCKET NUMBER:

COUNTY: CALDWELL

PRINCIPAL NAME: WALTON TEXAS LP

CN NUMBER: CN604017491

FROM

NAME: Rebecca Taylor Rockeymoore

E-MAIL: saludhealingarts@gmail.com

COMPANY: Salud Massage & Healing Arts

ADDRESS: 308 SALTILLO ST
SAN MARCOS TX 78666-7828

PHONE: 5125505526

FAX:

COMMENTS: There should be a total nitrogen limit. A limit only on ammonia-nitrogen is not a sufficient substitute. Limit of 1 mg/l total phosphorus is not sufficient to prevent algae blooms, and the resulting drop in dissolved oxygen levels leads to changes in aquatic life. Minimum dissolved oxygen level of 4 mg/l is not sufficient to maintain existing Dissolved Oxygen levels in the receiving water should be at least 6 mg/l. They should require UV disinfection instead of chlorine, which is harmful to aquatic life. There are groundwater concerns of leaching into local water wells. Permits should

require beneficial reuse of effluent. The wastewater treatment plant will cause nuisance conditions in terms of odor, noise, light, and traffic. A class C operator is not sufficient. It should require a Class A operator. Discharge will have harmful effects on terrestrial wildlife and domestic livestock. Hemphill Creek flows into Morrison Creek, which often floods at the low-water crossing, which took the life of a couple a few years ago. More discharge could increase flooding issues

Lori Rowe

From: PUBCOMMENT-OCC
Sent: Thursday, March 17, 2022 9:16 AM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: Public comment on Permit Number WQ0015918001

From: tams122080@live.com <tams122080@live.com>
Sent: Wednesday, March 16, 2022 3:21 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number WQ0015918001

REGULATED ENTY NAME COTTON CENTER MARTINDALE WWTP

RN NUMBER: RN111097283

PERMIT NUMBER: WQ0015918001

DOCKET NUMBER:

COUNTY: CALDWELL

PRINCIPAL NAME: WALTON TEXAS LP

CN NUMBER: CN604017491

FROM

NAME: MRS Tamara Stroud

E-MAIL: tams122080@live.com

COMPANY:

ADDRESS: 50 SQUIRREL RUN 602
SAN MARCOS TX 78666-8132

PHONE: 2812034661

FAX:

COMMENTS: 1) There should be a total nitrogen limit. A limit only on ammonia-nitrogen is not a sufficient substitute. 2) Limit of 1 mg/l total phosphorus is not sufficient to prevent algae blooms, and the resulting drop in dissolved oxygen levels leads to changes in aquatic life. 3) Minimum dissolved oxygen level of 4 mg/l is not sufficient to maintain existing Dissolved Oxygen levels in the receiving water. Should be at least 6 mg/l. 4) Should require UV disinfection instead of chlorine, which is harmful to aquatic life. 5) Groundwater concerns of leaching into local water wells, which was also a

concern with Cherryville and Riverbend Ranch. 6) Permit should require beneficial reuse of effluent. 7) Wastewater treatment plant will cause nuisance conditions in terms of odor, noise, light, and traffic. 8) Class C operator is not sufficient. Should require a Class A operator. 9) Discharge will have harmful effects on terrestrial wildlife and domestic livestock 10) Hemphill Creek (discharge point) flows into Morrison Creek which often floods at the low-water crossing, and actually took the life of a couple a few years ago. More discharge could increase flooding issues.

Lori Rowe

From: PUBCOMMENT-OCC
Sent: Wednesday, April 13, 2022 2:37 PM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: Public comment on Permit Number WQ0015918001

From: rdt@tilleyinterests.com <rdt@tilleyinterests.com>
Sent: Wednesday, April 13, 2022 1:34 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number WQ0015918001

REGULATED ENTY NAME COTTON CENTER MARTINDALE WWTP

RN NUMBER: RN111097283

PERMIT NUMBER: WQ0015918001

DOCKET NUMBER:

COUNTY: CALDWELL

PRINCIPAL NAME: WALTON TEXAS LP

CN NUMBER: CN604017491

FROM

NAME: Ray Don Tilley

EMAIL: rdt@tilleyinterests.com

COMPANY: Gossamer Joy

ADDRESS: 125 AUGUSTA DR
WOODCREEK TX 78676-2515

PHONE: 5127970638

FAX:

COMMENTS: Speaking as an individual, I implore the applicant to maximize TLAP and 210 reuse, reserving any discharge as the last option and treating to a standard that comports with Dr Ryan King's objective scientific study of nutrient levels that drive algal growth. Surely, within over 2,700 acres, Walton Texas LP can maximize innovative One Water principles and cost-effective strategies to achieve the same development potential on a fraction of the water supply and

no discharge into Texas' pristine streams. I offer my assistance freely to assemble helpful experts who can help shape a sustainable water and wastewater plan.

Lori Rowe

From: PUBCOMMENT-OCC
Sent: Tuesday, April 12, 2022 11:50 AM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: Public comment on Permit Number WQ0015918001

From: rdt@tilleyinterests.com <rdt@tilleyinterests.com>
Sent: Monday, April 11, 2022 8:11 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number WQ0015918001

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Lori Rowe

From: PUBCOMMENT-OCC
Sent: Monday, March 21, 2022 1:27 PM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: Public comment on Permit Number WQ0015918001

From: billyturner01@hotmail.com <billyturner01@hotmail.com>
Sent: Monday, March 21, 2022 1:11 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number WQ0015918001

REGULATED ENTY NAME COTTON CENTER MARTINDALE WWTP

RN NUMBER: RN111097283

PERMIT NUMBER: WQ0015918001

DOCKET NUMBER:

COUNTY: CALDWELL

PRINCIPAL NAME: WALTON TEXAS LP

CN NUMBER: CN604017491

FROM

NAME: BILLY TURNER

E-MAIL: billyturner01@hotmail.com

COMPANY:

ADDRESS: PO BOX 216 105 South Main
FENTRESS TX 78622-0216

PHONE: 5122127202

FAX:

COMMENTS: Please assure that there are limits on total nitrogen, limit phosphorus to less than 1mg, ensure dissolved oxygen is at least 6mg/l, require UV disinfection instead of Chlorine, require beneficial reuse of effluent, limit wastewater treatment plant nuisance conditions, require a Class A operator.

Lori Rowe

From: PUBCOMMENT-OCC
Sent: Wednesday, March 16, 2022 2:33 PM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: Public comment on Permit Number WQ0015918001

MWD
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From: kurt.tx@gmail.com <kurt.tx@gmail.com>
Sent: Wednesday, March 16, 2022 2:05 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number WQ0015918001

REGULATED ENTY NAME COTTON CENTER MARTINDALE WWTP

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PRINCIPAL NAME: WALTON TEXAS LP

CN NUMBER: CN604017491

FROM

NAME: Kurt Waldhauser

E-MAIL: kurt.tx@gmail.com

COMPANY:

ADDRESS: 1103 EARLE ST kurt.tx@gmail.com
SAN MARCOS TX 78666-2852

PHONE: 5122142947

FAX:

COMMENTS: There should be a total nitrogen limit. A limit only on ammonia-nitrogen is not a sufficient substitute. Limit of 1 mg/l total phosphorus is not sufficient to prevent algae blooms, and the resulting drop in dissolved oxygen levels leads to changes in aquatic life. Minimum dissolved oxygen level of 4 mg/l is not sufficient to maintain existing Dissolved Oxygen levels in the receiving water. Should be at least 6 mg/l. Should require UV disinfection instead of chlorine, which is harmful to aquatic life. Groundwater concerns of leaching into local water wells, which was also a concern with

Cherryville and Riverbend Ranch. Permit should require beneficial reuse of effluent. Wastewater treatment plant will cause nuisance conditions in terms of odor, noise, light, and traffic. Class C operator is not sufficient. Should require a Class A operator. Discharge will have harmful effects on terrestrial wildlife and domestic livestock Hemphill Creek (discharge point) flows into Morrison Creek which often floods at the low-water crossing, and actually took the life of a couple a few years ago. More discharge could increase flooding issues.

Lori Rowe

From: PUBCOMMENT-OCC
Sent: Tuesday, April 12, 2022 12:00 PM
To: PUBCOMMENT-OCC2; PUBCOMMENT-OPIC; PUBCOMMENT-ELD; PUBCOMMENT-WQ
Subject: FW: Public comment on Permit Number WQ0015918001

From: brian@savebartoncreek.org <brian@savebartoncreek.org>
Sent: Monday, April 11, 2022 6:00 PM
To: PUBCOMMENT-OCC <PUBCOMMENT-OCC@tceq.texas.gov>
Subject: Public comment on Permit Number WQ0015918001

REGULATED ENTY NAME COTTON CENTER MARTINDALE WWTP

RN NUMBER: RN111097283

PERMIT NUMBER: WQ0015918001

DOCKET NUMBER:

COUNTY: CALDWELL

PRINCIPAL NAME: WALTON TEXAS LP

CN NUMBER: CN604017491

FROM

NAME: Brian Zabcik

EMAIL: brian@savebartoncreek.org

COMPANY: Save Barton Creek Association

ADDRESS: 15241 STATE HIGHWAY 53 UNIT 670
TEMPLE TX 76501-3490

PHONE: 7182880341

FAX:

COMMENTS: Save Barton Creek Association was founded in 1979, making us one of the oldest citizens' environmental groups in Texas. Our mission focus has expanded over the years to protect water quality in all Central Texas streams. SBCA also serves as the convener for No Dumping Sewage, a coalition of organizations working to prevent sewage pollution throughout the Hill Country. SBCA and our partners are especially aware of how nutrients in treated wastewater have led to algae growths in several locations. Algae has been especially prevalent on the South San Gabriel

River below Liberty Hill's wastewater treatment plant. The city's current discharge permit started with a total phosphorus limit of 0.5 milligrams per liter. Even though the limit has since been lowered to 0.15 mg/L, algae still blankets the river. For this reason, SBCA believes that the total phosphorus limit of 1 mg/L as proposed in draft permit WQ0015918001 for the Walton Group will prove to be completely inadequate to prevent similar algae growth. Based on our consultations with wastewater researchers and engineers, we would recommend a total phosphorus limit of no more than 0.1 mg/L. And because phosphorus is only one of the two nutrients in treated effluent that can feed algae growth, we also urge TCEQ to add a total nitrogen limit of 4 mg/L to the Walton Group's permit.