VIA EMAIL & PUBLIC COMMENT WEBSITE

May 17, 2024

Elizabeth Gallup
Surface Water Withdrawal Team Leader
Virginia Department of Environmental Quality
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Virginia Department of Environmental Quality
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Silvia Gazzera
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Norfolk District Regulatory Branch
Northern Section
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RE: Caroline County Draft Permit for Application No. 2020-0514

Dear Ms. Gallup, Ms. Major and Ms. Gazzera:

Through this letter, the Rappahannock Tribe raises its concerns about the draft water intake permit issued to Caroline County. **The Tribe does not oppose water intake from the Rappahannock River for drinking water but is opposed to the use of water intake for industrial cooling water purposes, especially for data centers.** The reasons for the Tribe's opposition are listed below. **The Rappahannock Tribe requests a public hearing regarding this permit.**

MAJOR CONCERNS:

1. ***If permitted, the data center project will impact migratory fisheries including, but not limited to, federally protected Atlantic Sturgeon, as well as River Herring, American Shad, and Striped Bass.***

The Virginia Department of Wildlife Resources (VADWR) has previously noted that federally endangered and threatened sturgeon are found within the project's area.[1] The Essex County Conservation Alliance (ECCA) has also found sturgeon in the area. ECCA has evidence that sturgeons have been found, caught, and released in pound nets in the Rappahannock River over the last five years. In addition to the photographs documenting the presence of sturgeon, the ECCA has published at least two articles about them in the organization's magazine.[2] In addition, the Rappahannock river is strongly considered an active sturgeon habitat, and NOAA (the National Oceanic and Atmospheric Administration) and VADWR have both designated it as an important migratory fish habitat.

2. ***If permitted, the data center project will affect the water supply of tribal land located downstream.***

Caroline County Director of Public Works/Utilities Joseph Schiebel noted in his October 30, 2023 town hall presentation on the environmental impacts of data centers that "water demands increase when the temperatures rises *[sic]*."[3] Given that the earth is warming at a historic rate and temperatures continue to increase, the potential for the Rappahannock River to be abused is ripe.

Not only was the Rappahannock River placed on drought watch status at the end of 2023,[4] but "2023 was the warmest year on record globally. The trend has clearly been toward warmer average temperature years nationally, regionally, and locally in recent decades — not a steady upward line but a tendency for more frequent years ranking among the warmest and fewer ranking among the coolest as average temperatures go up and down quite a bit as we focus more on a smaller region."[5] The Rappahannock River is of utmost importance to the Tribe. "The areas surrounding the Rappahannock River are the ancestral homelands of the Tribe, and the Tribe continues to live, visit, and conduct traditional cultural practices along the river. Native fish, bird, and plant species along the river are of cultural significance to the Tribe."[6]

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[1] (*See* emails from VADGIF employee Amy Ewing, true and correct copies of which are attached hereto, as Exhibit "A."

[2] True and correct copies of these ECCA photos and articles are attached hereto as Exhibit "B."

[3] *See* Slide 5 of "Public Utilities Presentation," *available at* https://co.caroline.va.us/CivicAlerts.aspx?AID=997 (last accessed November 21, 2023).

[4] Domina, G. (2023, December 7). *Drought Advisory Announced – What does it mean for the Rappahannock River?*. Friends of the Rappahannock. https://riverfriends.org/drought-advisory-announced/ (last accessed February 19, 2024).

[5] Myatt, K. (2024, January 5). *Snow and ice are likely this weekend as El Niño winter follows expected track*. Cardinal News. https://cardinalnews.org/2024/01/03/snow-and-ice-are-likely-this-weekend-right-on-track-for-an-el-nino-winter/

[6] Everett, K. (2022, April 7). *Rappahannock tribe acquires sacred site, ensuring perpetual conservation of Tribe's homeland and Bald Eagle Habitat*. Chesapeake Conservancy. https://www.chesapeakeconservancy.org/2022/04/01/rappahannock-tribe-acquires-sacred-site-ensuring-perpetual-conservation-of-tribes-homeland-and-bald-eagle-habitat/ (last accessed February 23, 2024).

3. ***The data center project will pollute natural resources with its use of diesel back-up generators.***

The use of diesel back-up generators will create pollution. According to the U.S. Environmental Protection Agency (EPA), "Human health, our environment, global climate and environmental justice are all affected by diesel emissions"[7] in the following ways:

- "Human Health - Exposure to diesel exhaust can lead to serious health conditions like asthma and respiratory illnesses and can worsen existing heart and lung disease, especially in children and the elderly. These conditions can result in increased numbers of emergency room visits, hospital admissions, absences from work and school, and premature deaths."[8]

- "Environment - Emissions from diesel engines contribute to the production of ground-level ozone which damages crops, trees, and other vegetation. Also produced is acid rain, which affects soil, lakes and streams and enters the human food chain via water, produce, meat, and fish. These emissions also contribute to property damage and reduced visibility."[9]

- "Global Climate - Climate change affects air and water quality, weather patterns, sea levels, ecosystems, and agriculture. Reducing greenhouse gas (GHG) emissions from diesel engines through improved fuel economy or idle reduction strategies can help address climate change, improve our nation's energy security, and strengthen our economy."[10]

4. ***This data center project is one of many, and the lack of coordination between the state and local governments regarding the use of natural resources is detrimental and will have deleterious effects for the tribe, Caroline County residents, and the Commonwealth at large.***

Local governments should be coordinating with each other and the state to determine the cumulative impacts that the data center projects will have on the environment and the health and safety of Commonwealth residents. "Leaders should not separate the joy they feel in attracting data centers from the pain their constituents feel in living with data centers and transmission lines, breathing

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[7] United States Environmental Protection Agency. (n.d.). Learn About Impacts of Diesel Exhaust and the Diesel Emissions Reduction Act (DERA). https://www.epa.gov/dera/learn-about-impacts-diesel-exhaust-and-diesel-emissions-reduction-act-dera

[8] *Id* (commas added for clarity).

[9] *Id* (commas added for clarity).

[10] *Id* (commas added for clarity).

pollution from diesel back-up generators, and having the quality and quantity of their freshwater resources threatened."[11]

Most of Caroline County's justification for 13.9 million gallons (about 52617199 L) per day is from Transit Oriented Development and mention of a "Water Master Plan." However, the Transit Oriented Development only covers "commercial" water demand not industrial demand, and industrial demand in this project is listed higher than any other category (4.63 mgd).[12] Data centers would make up part of the one-third of water usage that is considered "industrial" by the county,[13] and the Tribe finds this use of valuable water resources to cool data centers to be unacceptable.

Additionally, no justification has been given for the discharge of used water into the Mattaponi basin. The intake of 13.9 million gallons of water per day from the Rappahannock river is a NET LOSS because of this design. To date the tribe has not seen any information that justifies this activity as the only course of action.

The Potomac aquifer is currently shrinking for similar reasons, and the fact that there is not enough groundwater to go around is an important reason to NOT take surface water for data centers. "Groundwater withdrawals by companies, municipalities, and homeowners in eastern Virginia have diminished the groundwater supply in the Potomac Aquifer, making the region vulnerable to land subsidence, sea-level rise, and saltwater intrusion. The aquifer's groundwater is a limited natural resource because the surrounding clay and bedrock prevent water from recharging naturally."[14] Solving a "water use" problem by increasing water use from another source for industrial purposes is not a viable solution.

Furthermore, the state government does not have the data nor the regulations in place to ensure that this permit will not affect drinking water access for downstream communities. It is the tribe's position that if a permit is issued, corroborating data regarding water supply should be obtained.

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[11] Main, I. (2023, November 21). *A 5-point plan for Virginia's Data Centers*. Virginia Mercury. https://www.virginiamercury.com/2023/11/21/a-5-point-plan-for-data-centers/?emci=496854f4-d787-ee11-8925-00224832e811&emdi=855631c2-6988-ee11-8925-00224832e811&ceid=344506

[12] *See* Caroline County October 19, 2023 Letter in Response to Virginia Department of Environmental Quality (VADEQ) Request for Additional Information, pp. 3-5.

[13] "Currently, about 44% of the county's water is used for residential purposes: drinking, cooking, washing, bathing and flushing toilets. Another 23% goes to businesses such as restaurants and offices and the remaining 33% is for industrial users, according to the county. . . . Caroline officials listed data centers in the last category[.]" Dyson, C. (2024, January 24). *Caroline explains water woes, need for river withdrawal*. The Free Lance-Star. https://fredericksburg.com/news/local/caroline-county-explains-water-woes-need-to-withdraw-water-from-rappahannock-river/article_12fcae92-ba19-11ee-8ccc-1307fe4c9724.html (last accessed February 19, 2024).

[14] Hampton Roads Sanitation District. (n.d.). *The Potomac Aquifer: A diminishing resource*. HRSD. https://www.hrsd.com/swift/potomac-aquifer-diminishing-resource (last accessed February 23, 2024).

Lastly, as you may be aware, Virginia House Bill 1157 passed on April 17th, 2024, and that bill requires ***meaningful*** consultation with federally recognized tribes like the Rappahannock. However, Caroline County has never consulted with the Tribe. County officials met with the Tribe once – to say what they were doing. ***That is not consultation***. The Rappahannock Tribe has also requested to meet with Amazon Web Services about the proposed data center to discuss concerns and they refused to do so.

Given the lack of meaningful consultation, along with all of the aforementioned reasons, the Rappahannock Tribe opposes the granting Caroline County a water intake permit to the extent that it allows the taking of water from the river named after the Tribe to use for the purposes of data center cooling or otherwise designated "industrial use". **The Rappahannock tribe formally requests a public hearing be held for this draft permit.**

With respect,

G. Anne Richardson
Chief, Rappahannock Tribe
Rappahannock Tribal Center
5036 Indian Neck Road
Indian Neck, VA 23148
info@rappahannocktribe.org

CC (via email):

Joseph Schiebel, Director
Caroline County Department of Public Utilities
jschiebel@co.caroline.va.us

Eric Seavey, Water Withdrawal Permitting Manager
Virginia Department of Environmental Quality
eric.seavey@deq.virginia.gov

Elizabeth Gallup, Surface Water Withdrawal Team Lead
Virginia Department of Environmental Quality
elizabeth.gallup@deq.virginia.gov

Claire Gorman, Habitat Management
Virginia Marine Resources Commission
claire.gorman@mrc.virginia.gov

EXHIBIT "A"

Commonwealth of Virginia

Ewing, Amy <amy.ewing@dgif.virginia.gov>

ESSLog# 38809_pre-app_CarolineCountyIntake_DGIF_AME20190627

1 message

Ewing, Amy <amy.ewing@dgif.virginia.gov> Thu, Jun 27, 2019 at 12:38 PM
To: "Moore, Shana" <shana.moore@deq.virginia.gov>
Cc: Watson Brian fci48971 <brian.watson@dgif.virginia.gov>, Scott Smith <scott.smith@dgif.virginia.gov>, Robert Greenlee <bob.greenlee@dgif.virginia.gov>, Paul Bugas <paul.bugas@dgif.virginia.gov>

Shana,
Based on the information presented during the pre-application meeting and a review of the shapefiles for the proposed Caroline County intake on the Rappahannock River, we offer the following preliminary comments and recommendations:

As you know, we typically recommend that to best protect resident aquatic species from impingement and entrainment, the proposed surface water intake be fitted with a 1mm mesh screen and that the intake velocity not exceed 0.25 fps. In addition, to ensure continued access to necessary instream habitats, we recommend that the intake not withdraw more than 10% instantaneous flow and/or result in significant changes in water quality, as depicted by changes in salinity. We are not yet comfortable that the modeling that has been done so far for this project clearly depicts anticipated salinity changes during times when the system is most vulnerable, which is where our concern typically rests. It appears the model looked at changes that may occur across an entire year assuming usage of the average day withdrawals. However, even with these obscured results, changes in salinity were expected to occur at all three sites assessed. So that we can clearly assess whether anticipated changes in salinity resulting from operation of the proposed intake, we recommend that modeling be performed assuming usage of max day withdrawals during periods of drought. Upon review of the results of such modeling, we will make additional comments regarding the impact salinity changes may have on resident and migratory aquatic fauna.

We document federal Endangered Atlantic sturgeon from the project area. This stretch of the Rappahannock River has been designated a Threatened and Endangered Species Water due to the presence of this species. The Rappahannock River at this location also has been designated a confirmed Anadromous Fish Use Area. If any instream work in the Rappahannock River is necessary to install this intake and/or associated infrastructure, we recommend that such work adhere to a time of year restriction protective of these species from February 15 through June 30th and August 1 through November 15 of any year.

Also as mentioned during our conference call, the segment of the Rappahannock River on which the proposed intake is located, is known to be highly productive for freshwater mussels, particularly for alewife floaters and tidewater muckets, both of which are Tier IV a Species of Greatest Conservation Need (SGCN). Based on the productivity in this area, we collect broodstock from this part of the river and also have released propagated mussels in the Rappahannock River. Based on recent surveys, the data from which have not been entered into our systems, state threatened green floaters have now been documented from below the Rappahannock River fall line, so must also be considered as potentially present from the project area. As such, it is likely that we will recommend that prior to any instream work, a mussel survey be performed from 100 meters upstream through 400 meters downstream of impact areas. This survey should be performed by a qualified, permitted biologist, preferably no more than six months prior to the start of construction. If mussel relocations are necessary, they should be coordinated with Brian Watson, VDGIF Region II Aquatic Resources Biologist (434-525-7522), and no federally listed species should be relocated without first coordinating with the USFWS (804-693-6694). All survey and relocation activities should adhere to the attached draft guidance. In addition, we recommend a time of year restriction on all instream work (not including any mussel surveys) from April 15 through June 15 and August 15 through September 30 of any year. Survey results should be made available to Amy Ewing in VDGIF's Headquarters office in Henrico and Brian Watson in VDGIF's Forest Office. Upon review of the results, we will make final recommendations regarding the protection of listed species known from the area. All survey reports should reference the five-digit ESSLog# displayed in the subject line of this email.

We recommend conducting any in-stream activities during low or no-flow conditions, using non-erodible cofferdams or turbidity curtains to isolate the construction area, blocking no more than 50% of the streamflow at any given time, stockpiling excavated material in a manner that prevents reentry into the stream, restoring original streambed and streambank contours, revegetating barren areas with native vegetation, and implementing strict erosion and sediment control measures. To minimize potential wildlife entanglements resulting from use of synthetic/plastic erosion and sediment control matting, we recommend use of matting made from natural/organic materials such as coir fiber, jute, and/or burlap. To minimize harm to the aquatic environment and its residents resulting from use of the Tremie method to install concrete, installation of grout bags, and traditional pouring of concrete, we recommend that such activities occur only in the dry, allowing all concrete to harden and cure prior to contact with open water.

We historically document bald eagle nests from the project area. To ensure protection of bald eagles in compliance with the Bald and Golden Eagle Act, we recommend using the Center for Conservation Biology (CCB) Eagle Nest Locator to determine if any active eagle nests are known from the project area. If active bald eagle nests have been documented from the project area, we recommend that the project move forward in a manner consistent with state and federal guidelines for protection of bald eagles; and coordination, as indicated, with the U.S. Fish and Wildlife Service regarding possible impacts upon bald eagles or the need for a federal bald eagle take permit.

Once the preferred route for the waterline has been determined, we will provide comments about any impacts that might have on wildlife and/or resources under our jurisdiction. Typically, we prefer that such utilities be co-located within already-disturbed corridors.

To minimize overall impacts to wildlife and our natural resources, we offer the following comments about development activities: We recommend that the applicant avoid and minimize impacts to undisturbed forest, wetlands, and streams to the fullest extent practicable. Avoidance and minimization of impact may include relocating stream channels as opposed to filling or channelizing as well as using, and incorporating into the development plan, a natural stream channel design and wooded buffers. We recommend maintaining undisturbed naturally vegetated buffers of at least 100 feet in width around all on-site wetlands and on both sides of all perennial and intermittent streams. We recommend maintaining wooded lots to the fullest extent possible. We generally do not support proposals to mitigate wetland impacts through the construction of stormwater management ponds, nor do we support the creation of in-stream stormwater management ponds.

We recommend that the stormwater controls for this project be designed to replicate and maintain the hydrographic condition of the site prior to the change in landscape. This should include, but not be limited to, utilizing bioretention areas, and minimizing the use of curb and gutter in favor of grassed swales. Bioretention areas (also called rain gardens) and grass swales are components of Low Impact Development (LID). They are designed to capture stormwater runoff as close to the source as possible and allow it to slowly infiltrate into the surrounding soil. They benefit natural resources by filtering pollutants and decreasing downstream runoff volumes.

We recommend that all tree removal and ground clearing adhere to a time of year restriction protective of resident and migratory songbird nesting from March 15 through August 15 of any year. We recommend coordination with the USFWS regarding potential impacts upon federally Threatened northern long-eared bats associated with tree removal.

We recommend adherence to erosion and sediment controls during ground disturbance. To minimize potential wildlife entanglements resulting from use of synthetic/plastic erosion and sediment control matting, we recommend use of matting made from natural/organic materials such as coir fiber, jute, and/or burlap.

This project is located within 2 miles of a documented occurrence of a state or federal threatened or endangered plant or insect species and/or other Natural Heritage coordination species. Therefore, we recommend coordination with VDCR-DNH regarding the protection of these resources.

Thanks! Amy

Amy Ewing
Environmental Services Biologist
Manager, Fish and Wildlife Information Services

P 804.367.2211
Virginia Department of Game & Inland Fisheries
CONSERVE. CONNECT. PROTECT.
A 7870 Villa Park Drive, P.O. Box 90778, Henrico, VA 23228
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Commonwealth of Virginia

Ewing, Amy <amy.ewing@dwr.virginia.gov>

Re: ESSLog# 38809_20-0514_Caroline County Intake_DGIF_AME20200602

1 message

Ewing, Amy <amy.ewing@dwr.virginia.gov> Mon, Jul 13, 2020 at 3:10 PM
To: "Arnold, Roger" <rarnold@hazenandsawyer.com>
Cc: "Moore, Shana" <shana.moore@deq.virginia.gov>, "amy.ewing@dgif.virginia.gov" <amy.ewing@dgif.virginia.gov>, "Tabor, Chris" <ctabor@hazenandsawyer.com>, "jschiebel@co.caroline.va.us" <jschiebel@co.caroline.va.us>

Thank you. Please note the TOYR for anadfish/sturgeon is February 15 through **June 30** and August 1 through November 15 of any year. I apologize if I originated that mistake. Please confirm no instream work through June 30th. Everything else seems appropriate.

Thanks, Amy

Amy Martin Ewing
Environmental Services Biologist
Manager, Fish and Wildlife Information Services
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Virginia Department of Wildlife Resources
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On Mon, Jul 13, 2020 at 3:03 PM Arnold, Roger <rarnold@hazenandsawyer.com> wrote:

> Amy,
>
> We appreciate your review of the proposed project. Please refer to the attached response letter regarding the time of year restrictions and mussel survey.
>
> Thank you,
>
> Roger
>
> **Roger B. Arnold, P.E.**
>
> **Associate | Hazen and Sawyer**
>
> 1555 Roseneath Road, Richmond, VA 23230
>
> (804) 545-5095 (direct) | (804) 366-5415 (mobile)
>
> rarnold@hazenandsawyer.com | hazenandsawyer.com
>
> ---------- Forwarded message ----------
> From: **Ewing, Amy** <amy.ewing@dgif.virginia.gov>
> Date: Tue, Jun 2, 2020 at 12:58 PM
> Subject: ESSLog# 38809_20-0514_Caroline County Intake_DGIF_AME20200602

To: Moore, Shana <shana.moore@deq.virginia.gov>
Cc: Scott Smith <scott.smith@dgif.virginia.gov>

Shana,

I have been looking over the application for the subject project. You should have my comments from the pre-application meeting and review. They basically remain the same, other than we appreciate their adherence to our recommendations for the intake sizing and intake velocity. I didn't see anything in their plans about adhering to the TOYR or really any of the guidance we provided. I recommend they update it to include our recommendations for protection of anadromous fishes, including federally Endangered Atlantic Sturgeon, and listed freshwater mussels as depicted in the attached.

We continue to recommend consideration of salinity impacts and continued coordination with us and VIMS regarding those impacts.

It appears both pipeline corridors appear to be co-located with major roadways, which we typically support. Unfortunately, due to limited capabilities at my home office, I cannot efficiently review the pipeline corridors, but reiterate our general comments regarding linear utilities. If any instream work is necessary to install the pipeline, we recommend that the lat/long coordinates for each stream crossing be provided to us for further review, along with a shapefile of the finally chosen route.

The North Anna River is located downstream of proposed new WTP site. The North Anna River at this location has been designated a Confirmed Anadromous Fish Use Area and a Threatened and Endangered Species Water due to the presence of Atlantic Sturgeon. If any instream work in the South Anna River and/or its tributaries is necessary to develop the new treatment plan, we recommend additional coordination with us regarding that work.

All other/additional comments provided during earlier review remain valid.

Thanks, Amy

Amy Martin Ewing
Environmental Services Biologist
Manager, Fish and Wildlife Information Services
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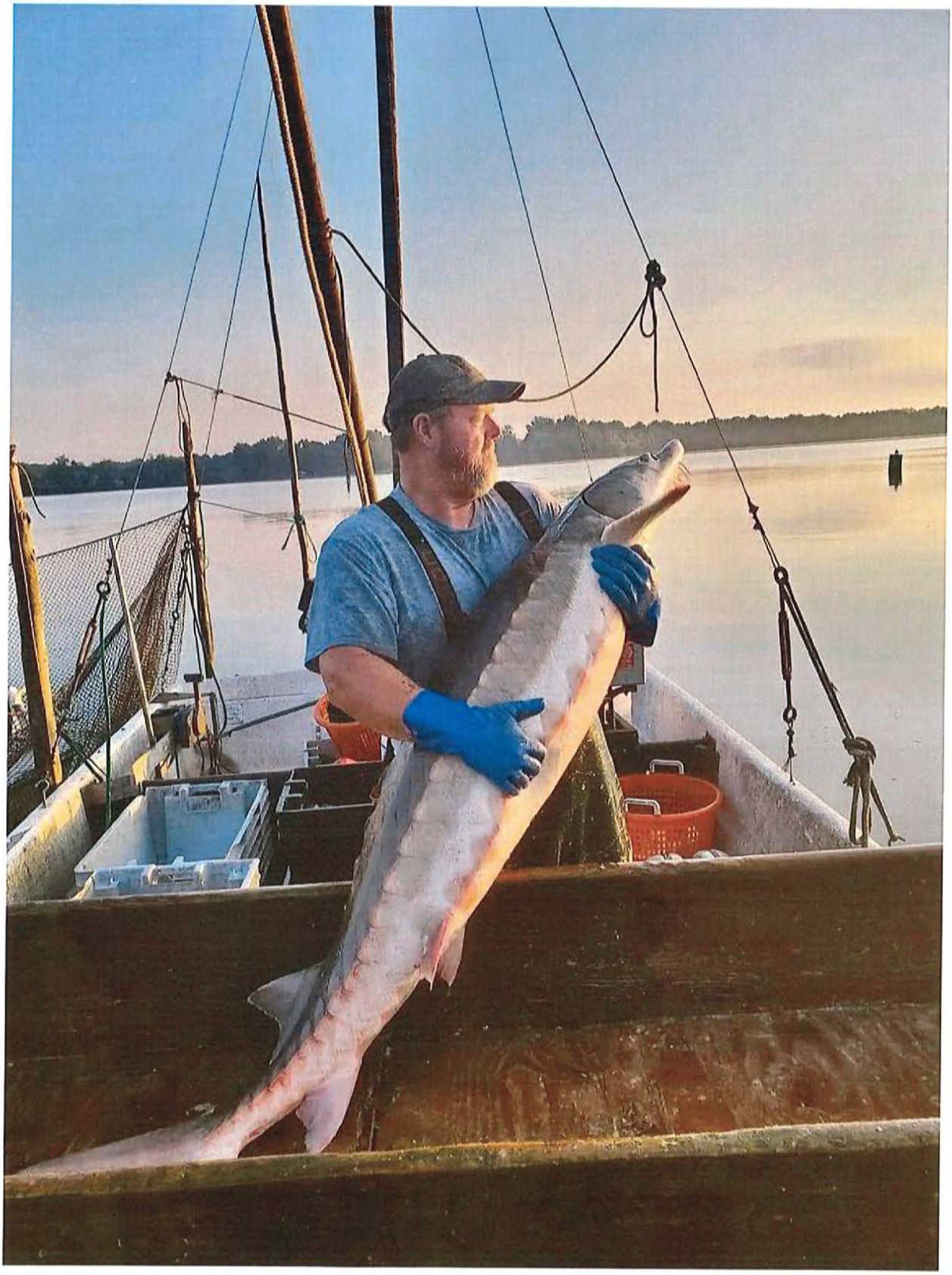
EXHIBIT "B"



ATLANTIC STURGEON STOIRY FOR ECCA MAGAZINE 2021

Below are edited notes from Dr. Matt Balazik, who holds joint appointments with Virginia Commonwealth University and the U.S. Army Corps of Engineers, on his Atlantic sturgeon tagging studies in the Rappahannock 2015-2019, funded by the National Oceanic and Atmospheric Administration (NOAA) under the Endangered Species Act. The photos show Leedstown waterman Wayne Fisher with a male Atlantic sturgeon caught last year in his pound net between Beverly Marsh and Carters Wharf and quickly released alive. Wayne reports that in the late Spring and Fall seasons, such sturgeon are not uncommon catches in his nets.

Rappahannock River--Fall, 2015

Balazik and his crew made two exploratory sampling trips to the Rappahannock River in the Fall of 2015, launching their skiff at Hicks Landing. Recreational boaters had reported adult sturgeon breaching in the Hicks Landing-Hopyard Bar area. They set their gill nets for two days, one just downstream of Hicks Landing and once just above Hopyard Bar. They captured one male sturgeon, which expelled milt during collection, and surgically implanted a telemetry tag to track the fish's movements across the broad array of receivers deployed cooperatively by multiple research institutions throughout the Chesapeake and along the Atlantic coast. He noted at the time that the presence of adults suggests that Fall spawning occurs in the Rappahannock as it does in the James, the York (including the Pamunkey and Mattaponi), and the Nanticoke (including Marshyhope Creek).

Rappahannock River--Fall, 2016

VCU personnel made five sampling trips to the Rappahannock during the 2016 Fall spawning run, setting their gill nets on September 19-21 and September 30-October 1 in several reaches between Camden, below Port Royal, and Hopyard Bar. To reduce the catch of large, ripe females, they deployed only 25 cm to 32 cm stretch mesh nets instead of ones with larger mesh sizes. The nets never blocked more than half of the river channel's width to ensure that some Atlantic Sturgeon could pass without interference.

Operating on strict guidelines to protect fish health, the team chose not to sample on September 21 due to relatively low dissolved oxygen levels (5.3 mg/l) and high water temperatures (27^0 C/81^0 F). Even so, they caught seven male fish during this period and surgically placed a 10-year VEMCO tag in each, following protocols permitted under their scientific and Endangered Species Act collecting permits. All seven fish expelled sperm, and six had spawning rubs on their underbellies.

VCU and VIMS receiver arrays provided telemetry data for the Rappahannock, showing when the tagged fish left the upper River. Other researchers' receivers detected the fish offshore later. One of the seven males was a recapture that had been tagged originally by the U.S. Fish & Wildlife Service at the mouth of the Rappahannock on December 13th, 2007, when the fish was 85 cm/34" in length. It had nearly doubled in length between captures. The male caught and tagged in the Rappahannock in 2015 pinged a receiver at the mouth of the River in early September, 2016 but did not move up the river at that time. Currently they do not know where the fish tagged in 2015 went during the 2016 Fall spawn season. Adult males typically move upstream when the water temperature drops to approximately 28^0 C/82.5^0 F. This behavior is

consistent with that of James River fish. Rappahannock males generally migrate out of the river when water temperatures drop to around 20^0 C/68^0F, also similar to James River fish.

Rappahannock River—Fall, 2017

Dr. Balazik and his team significantly modified their Rappahannock sampling in the Fall of 2017. They changed the sampling area to accommodate another research group working in the area they had targeted the previous two years (Camden to Hopyard Bar). They felt it better for the spawning adults to avoid putting on too much pressure, because they had (and still have) little information on the actual population size of the Rappahannock's spawning fish. Thus, they decided to sample downstream for post-spawn fish. In spite of expending three times the effort of previous years, they did not catch any adult sturgeon in the Rappahannock during 2017. This result was a surprise, since it had been relatively easy during the previous two years to catch adults, though they realized that they had significantly changed their sampling area. The catch failure may simply resulted from a poor spawning run, but Balazik notes that they still have too little data to elucidate trends in the Rappahannock.

Rappahannock River—Fall, 2018

As was the case in the James, 2018's warm water temperatures and heavy river flows hindered adult sampling in the Rappahannock. The team could not start upstream sampling until mid-September due to high water temperatures. Those temperatures finally dropped, and they started sampling on September 12th in the Camden-to-Hopyard Landing area where they had had great success in 2015 and 2016. Despite heavy flow, they were able to get their net anchors to hold, but the nets themselves loaded up with fallen leaves and torn-out underwater grasses. They spent ten days sampling upstream and caught two adult males, both on September 14th. They had thick milt running during processing and tagging.

They continued sampling upstream until October 11th, then moved downstream to Tappahannock in an attempt to catch sturgeon leaving the river. Colder temperatures allowed for longer gill net soak times. They had nets out almost around the clock from October 15th to October 21st but unfortunately were unsuccessful.

In the process, they met several local people along the upper Rappahannock River that shared stories of adult sturgeon being caught in the deep holes at the base of the old Embrey Dam at Fredericksburg during the spring. These deep holes, of course, filled with silt when the dam went down in 2004. Some of the people also told of a few adult sturgeon caught in the 1970s and 1980s [which squares with stories Wayne Fisher heard from his father and the Oliff brothers, with whom they fished].

Rappahannock River--Fall, 2019

September temperatures were lower in the Rappahannock, allowing for two short sampling trips before work could start in the James. The team caught two adults in the Camden area. Both had spawning rubs, and the team implanted telemetry tags. They also detected three fish in the sampling area that had been captured at Hicks Landing in 2016 and 2018.

Rappahannock River—2020-21

COVID shut down Matt Balazik's research opportunities on the Rappahannock, but Wayne Fisher and his family continued to fish their pound nets for blue catfish. In the process, he reports that "We caught some big sturgeon last year, including three in one day in October. One weighed around 125 pounds" (see photo), so the fall spawning run continues. We'll hope to hear more from both of these fishermen, scientific and commercial, in the fall of this year. Wayne also reports "a few small sturgeon this spring," hopeful signs of young natives that are spending their first couple of years in their home river.

Further Notes

Atlantic sturgeon researchers have been able to take small fin clips from their fish without causing harm, in order to analyze their genetic makeup. In a remarkable turn, the Nanticoke/Marshyhope fish seem to be more related to the York/Pamunkey/Mattaponi fish than to the stock in the James. When we asked Dr. Balazik about the Rappahannock, he replied, "We have very few genetics clips from there. As of right now, it seems that they mostly resemble the James River population and not the York and Marshyhope. Again, though, the current sample size is small, so it is difficult to fine-tune the population work yet."

This year, Dr. Balazik would like to deploy a new tool that has the potential to assess the size of the stock more efficiently. It is a sophisticated side-scan sonar system developed cooperatively with researchers at NOAA and Clemson University for sampling multiple Atlantic coastal rivers. It has shown great promise to date on the James and several South Carolina rivers. Unfortunately, he does not have funding for work specifically on the Rappahannock this year, and he has contracted obligations on the James that "have been piling up due to Covid-19 stuff."

Thus the conclusions for the Rappahannock's Atlantic sturgeon are tantalizing. Certainly, the fish are there and attempting to spawn, which is great news. ECCA will stay tuned for the time that researcher team becomes able to give our river's sturgeon the attention they deserve.

PS In a tantalizing incident on the Potomac, last spring a couple of regular anglers out of Fletcher's Boat House in Washington, DC caught and expertly released an even rarer shortnose sturgeon *(Acipenser brevirostrum)* while jigging for other species. It was the first from the Potomac in many years. Studies have turned up more shortnose sturgeon in the upper Chesapeake Bay, including at least one tagged in the Chesapeake Bay but later relocated in the Chesapeake and Delaware Canal and the Delaware River, which has a stronger stock than any Chesapeake rivers.

On this catch, Matt Balazik commented, "We've caught two shortnose in the James River. Genetics and telemetry data show both fish were from the Delaware. The gravid female we telemetered in February 2018 went through the Chesapeake/Delaware Canal a few months after being tagged and has been in the Delaware since. Neither of the two fish we caught in the James were near hypothesized spawning habitat. The recent one in the Potomac was in prime spawning habitat during the right time of year. Very interesting collection. I would have loved to have gotten a genetic sample and a telemetry tag in that fish. I talked to the two guys that caught the shortnose; they did everything perfectly. Much better than I would have probably done."