



**Background**

<b>Date of investigation:</b> March 19 2022 and March 22, 2022		<b>Time:</b> 0900 – 1300 on 3/19 and 1130 – 1530 on 3/22		<b>Date of kill:</b> 3/18/2022		<b>Investigators:</b> NWK	
<b>Water Body:</b> Back River				<b>GPS coordinates:</b>		<b>Lat:</b> 39.29337 °	
<b>Nearest town/ landmark:</b> Back River Wastewater Treatment Plant in Dundalk				<b>Long:</b> -76.48189°		<b>County:</b> Baltimore County	
<b>Water body type:</b> <input type="checkbox"/> Stream <input checked="" type="checkbox"/> River <input type="checkbox"/> Lake		<input type="checkbox"/> Private Pond <input type="checkbox"/> Reservoir <input type="checkbox"/> Estuary		<input type="checkbox"/> Wetland <input type="checkbox"/> Ocean <input type="checkbox"/>		<b>Primary land use:</b> <input type="checkbox"/> Agriculture <input checked="" type="checkbox"/> Industrial <input type="checkbox"/> Mining	
				<input checked="" type="checkbox"/> Office/ shopping <input checked="" type="checkbox"/> Residential <input checked="" type="checkbox"/> Urban		<input type="checkbox"/> Timber <input type="checkbox"/>	
<b>Activities in area of kill:</b> Back River Wastewater Treatment Plant releases treated effluent near where the dead fish were observed. Dense urban, industrial and commercial activity in the surrounding area of fish kill							

**Weather**

<b>Weather during investigation:</b> Mild and pleasant weather, partial sunny, and breezy		<b>Air Temp</b> ~65 F		<b>Wind direction/ speed:</b> Steady breeze from S/SW	
<b>Other observations/ recent weather:</b> Full moon causes spring tides with higher than normal high tide and lower than normal low tide. High winds from passing weather fronts.					

**Habitat/ Fauna**

<b>Water appearance (color/ odor):</b> River was greenish in color, normal; no observed dark discoloration or other indication of a pollutant discharge. No observable odor.
<b>Substrate type/ appearance:</b> Substrate in shallows had normal appearance.
<b>Algae presence:</b> Minor, small bloom of single cell green algae; possibly Chlamydomonas; count was 2424 cells/mL; not a HAB taxa.
<b>Other habitat observations:</b> Some yellowish pollen observed on water surface, but not extensive; normal to see pollen on the water this time of year.
<b>Presence/ behavior of live fish:</b> Did not observe live fish during investigation; water somewhat turbid.
<b>Presence/ types of aquatic invertebrates (order/ family/ relative abundance):</b> Not observed

**Water Quality**

Station	Time	Depth (m)	Diss. O <sub>2</sub> (ppm)	Temp °C	pH	Cond. (mS/cm)	Sal. (ppt)	Turbidity/ Secchi	Substrate/ other measurements
Pier, Cox Pt Park	0916	0.36	9.29	13.89	7.53	1388	0.70		DO % Sat: 90.4    ORP: 102
Pier, Back River Wastewater Trt Plant	1230	0.18 3.01	8.03 7.69	15.08 14.26	7.33 7.35	1137 1222	0.56 0.61		DO % Sat: 75.3    ORP: 178 DO % Sat: 75.3    ORP: 174

**Water Samples**

Station	Time	Bottle #	Analysis	Preservation Method
Pier at Cox Pt Park	0916	443	Examine for algae presence	Live, ambient temperature
Pier at Back River WWTP	1230	196	Examine for algae presence	Live, ambient temperature

**Fish Samples**

Station	Time	Sample #	Species	Analysis	Pres. Method
None taken					

**Kill Information**

<b>Upper Limit:</b> Back River WWTP		<b>Lower Limit:</b> Back River WWTP		<b>Stream miles (lake acres) affected:</b> Dead fish occurred along approximately 1000' of shoreline	
<b>Species affected</b>	<b>Size</b>	<b># counted</b>	<b>Extrapolated Total</b>	<b>\$/ea.</b>	<b>Value*</b>
Gizzard Shad	15"	250	250	unknown	unknown
<b>TOTALS</b>					
<p><b>Suspected cause of kill:</b> Unknown. I suspect the school of gizzard shad became confined in a shallow water area, which was exacerbated by spring tide lower than normal low tide, and subsequently depleted available oxygen. Reports of dark discharge and floating mats of dark matter were not observed during investigation. Creek appeared normal in color with no apparent odor. Water quality was normal for this time of year. If raw sewage discharge did occur, this would accelerate O2 depletion and would be primary cause. The dead gizzard shad were located along the shoreline by the Back River WWTP pier. No dead fish were observed at Cox Point Park or other nearby locations checked on Back River. Wind was blowing dead fish from shoreline by Back River WWTP out into open water of creek, so there may be more citizen reports as these fish move with the tide.</p> <p>UPDATED 3-22-2022: Follow-up investigation on this day confirmed that there are floating mats of filamentous algae currently in the Back River. Floating algal mats were found near the river mouth at Rocky Point St. Park boat ramp (39.24886 -76.40307). The filamentous algae was identified as Enteromorpha sp., a green, non-HAB taxa. The confirmation of filamentous algal biomass in the river supports the conclusion that the clumps of floating material observed by boaters on Friday, 3/18 was filamentous algae. A likely scenario is that the combination of extreme low and high tides with the full moon and high winds from passing weather fronts, resulted in water column inversion (deep water migrating to the surface), causing disturbance of the river bottom that resulted in the algae detaching from the bottom substrate and floating to the surface. These combined events of water column inversion and extreme tides also support the hypothesis that the fish kill occurred when a school of gizzard shad became trapped and disoriented in a body of hypoxic or anoxic water that migrated into the shallows. Since there was an absence of the typical conditions observed during a sewage spill – gray water, paper pulp, and sewage odor, it seems the hypotheses stated above provide the best explanation for the cause of the fish kill and the occurrence and identity of the floating mats (unless further evidence proves otherwise).</p>					
<b>Kill total or selective:</b> Not total kill					
<b>Condition of dead fish:</b> Fish appeared fairly fresh, with little decomposition, indicating they were killed in the last couple days.			<b>Symptoms of moribund fish:</b> None observed.		
<b>Additional Investigations:</b>					
<b>Agencies (persons) involved:</b>				<b>Phone #</b>	
Nicholas Kaltenbach				(443) 482-2710	
MDE Compliance personnel also conducting investigations					

**Investigators:** \_\_\_\_\_ **Date:** \_\_\_\_\_  
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**calculations/ addt'l notes:**