Assessment of Nitrogen and Phosphorus in Surface Waters of Inland Bays' Watersheds

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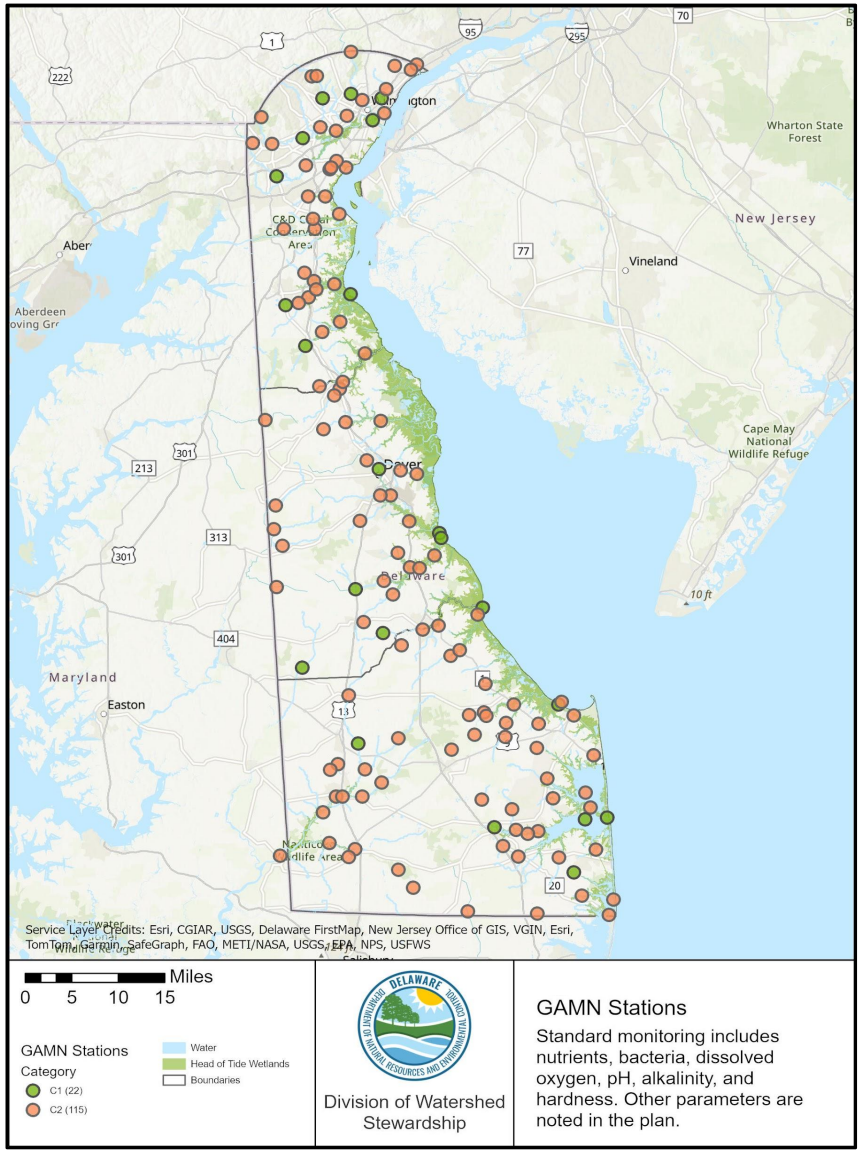
Delaware General Assessment Monitoring Network (GAMN)

DNREC GAM program monitors 137 stations throughout the State. There are 22 Category 1 (C1) stations and remaining 115 are Category 2 (C2) stations

DNREC monitors 24 stations in Inland Bays monthly and bi-monthly (depending on priority rotating basin plan)

Out of 24 stations, 4 stations are C1 stations and are always monitored monthly



Nitrogen and Phosphorus Criteria and Assessment

- Nutrients data from monitoring stations were used for assessment purposes and an Integrated Report (a biennial report mandated by CWA Section 303(d) and 305(d), where states assess and report the condition of their waters including identifying impaired waters and those needing TMDLs).

- Delaware has total nitrogen threshold of 3 mg/L and total phosphorus threshold concentration of 0.2 mg/L. Inland Bays' watersheds data were also compared with seasonal (March – October) DIN, DIP, and TSS criteria of 0.14mg/L, 0.01mg/L, and 20mg/L, respectively.

- All Inland Bays' watersheds nutrient Total Maximum Daily Loads (TMDLs) established by 2005 (https://dnrec.delaware.gov/watershed-stewardship/assessment/tmdls/)

How nitrogen and phosphorus were assessed and reported in the past

Appendix One: Final 2022 State of Delaware Integrated Report Station Roll Ups

Station	Assessment Unit	Watershed	Description	Total Phosphorus Count	Total Phosphorus LCL	Total Phosphorus Support	Ammonia Count	# Ammonia Samples > Critieria
106281	DE120-007-01-05	Christina River	Little Mill Creek at atlantic Avenue (USGS Gage 01480095)	42	0.03	1	42	--
111011	DE130-001	Dragon Run Creek	Rt. 9 Bridge	42	0.09	1	42	--
111031	DE130-002-02	Dragon Run Creek	Rt. 13 Bridge (flow at Rd. 407), Dragon Creek	42	0.05	1	42	--
308361	DE140-002	Indian River	Blackwater Creek at Rd. 54	40	0.05	1	41	--
308091	DE140-003	Indian River	Pepper Creek at Rt. 26	40	0.09	1	41	--
306181	DE140-004	Indian River	Buoy 49, Indian River	39	0.10	1	--	--

In the past nitrogen and phosphorus data were assessed, however assessment unit conditions for those in ATTAINS database was reported as nutrients

Appendix One: Final 2022 State of Delaware Integrated Report Station Roll Ups

Station	Assessment Unit	Watershed	Description	Enterococcus Geomean	Enterococcus Support	Total Nitrogen Count	Total Nitrogen LCL	Total Nitrogen Support
106281	DE120-007-01-05	Christina River	Little Mill Creek at atlantic Avenue (USGS Gage 01480095)	173.4	5	42	1.16	1
111011	DE130-001	Dragon Run Creek	Rt. 9 Bridge	38.8	1	42	0.94	1
111031	DE130-002-02	Dragon Run Creek	Rt. 13 Bridge (flow at Rd. 407), Dragon Creek	58.2	1	42	1.27	1
308361	DE140-002	Indian River	Blackwater Creek at Rd. 54	112.9	5	40	4.01	5
308091	DE140-003	Indian River	Pepper Creek at Rt. 26	177.6	5	40	2.10	1
306181	DE140-004	Indian River	Buoy 49, Indian River	38.6	5	39	2.15	1
308341	DE140-005	Indian River	Swan Creek at Rd. 297	192.3	5	40	2.47	1

How nitrogen and phosphorus were assessed and reported in the past….contd

ASSESSMENT UNIT ID	ASSESSMENT UNIT NAME	LOCATION DESCRIPTION	WATER SIZE	UNITS	USE NAME	PARAMETER NAME	2022 IR CATEGORY	FIRST LISTED CYCLE	TMDL PRIORITY RANKING	DELISTED (Y/N)	DELISTED REASON	COMMENT	IR CATEGORY CHANGE SUMMARY
DE130-001	Lower Dragon Run Creek	From dam at the water supply pond to the mouth of Delaware River	3.2	Miles	Primary Contact Recreation	ENTEROCOCCUS	2			N		Bacteria, listed 2002, delisted 2006, relisted 2008, Delisted 2010	NO CHANGE
DE130-001	Lower Dragon Run Creek	From dam at the water supply pond to the mouth of Delaware River	3.2	Miles	Fish, Aquatic Life, and Wildlife	DISSOLVED OXYGEN	4A	1998		N			NO CHANGE
DE130-001	Lower Dragon Run Creek	From dam at the water supply pond to the mouth of Delaware River	3.2	Miles	Fish, Aquatic Life, and Wildlife	NUTRIENTS	2			N		Nutrients, Listed 1998, Delisted 2012	NO CHANGE
DE130-002-01	Upper Dragon Run Creek	From headwaters to water supply pond	0.4	Miles	Fish, Aquatic Life, and Wildlife	NUTRIENTS	2			N		Nutrients, Listed 1996, Delisted 2012	NO CHANGE
DE130-002-01	Upper Dragon Run Creek	From headwaters to water supply pond	0.4	Miles	Fish, Aquatic Life, and Wildlife	DISSOLVED OXYGEN	4A	1996		N			NO CHANGE
DE130-002-01	Upper Dragon Run Creek	From headwaters to water supply pond	0.4	Miles	Primary Contact Recreation	ENTEROCOCCUS	2			N		Bacteria, Listed 1996, Delisted 2010, Relisted 2012, Delisted 2020	NO CHANGE
DE130-002-02	Upper Dragon Run Creek	From the confluence of the headwaters to the water supply dam	4.1	Miles	Fish, Aquatic Life, and Wildlife	AMMONIA, TOTAL	2			N			ADDED - Due to new data
DE130-002-02	Upper Dragon Run Creek	From the confluence of the headwaters to the water supply dam	4.1	Miles	Fish, Aquatic Life, and Wildlife	NUTRIENTS	2			N		Nutrients, Listed 1996, Delisted 2012	NO CHANGE
DE140-002	Blackwater Creek	Saline tidal waters from the headwaters to the confluence with Indian River Bay	7.2	Miles	Fish, Aquatic Life, and Wildlife	ZINC	2			N			ADDED - Due to new data
DE140-002	Blackwater Creek	Saline tidal waters from the headwaters to the confluence with Indian River Bay	7.2	Miles	Fish, Aquatic Life, and Wildlife	AMMONIA, TOTAL	2			N			ADDED - Due to new data
DE140-002	Blackwater Creek	Saline tidal waters from the headwaters to the confluence with Indian River Bay	7.2	Miles	Fish, Aquatic Life, and Wildlife	TOTAL SUSPENDED SOLIDS (TSS)	2			N			ADDED - Due to new data
DE140-002	Blackwater Creek	Saline tidal waters from the headwaters to the confluence with Indian River Bay	7.2	Miles	Fish, Aquatic Life, and Wildlife	DISSOLVED OXYGEN	2			Y	Applicable WQS attained; based on new data	DO, Listed 2002, Delisted 2022	CHANGED - Due to new data
DE140-002	Blackwater Creek	Saline tidal waters from the headwaters to the confluence with Indian River Bay	7.2	Miles	Fish, Aquatic Life, and Wildlife	NUTRIENTS	4A	2002		N			NO CHANGE
DE140-002	Blackwater Creek	Saline tidal waters from the headwaters to the confluence with Indian River Bay	7.2	Miles	Primary Contact Recreation	ENTEROCOCCUS	4A	1996		N			NO CHANGE

How are we reporting in the present IR2024 cycle

Assessment Unit ID	Use	Parameter	Status	IR Cat	Org IR Cat	First Listing	Delisted (Y/N)	Delisting Reason	Priority Ranking	Comments
DE130-001	Primary Contact Recreation	ENTEROCOCCUS	Cause	4A		2002	N	TMDL Approved or established by EPA (4a)		Listed 2002. Delisted 2006. Relisted 2008. Delisted 2010. Relisted 2024.
DE130-001	Fish, Aquatic Life, and Wildlife	NITROGEN	Meeting Criteria	2			N			Listed 1998. Delisted 2012. Refined from Nutrients 2024.
DE130-001	Fish, Aquatic Life, and Wildlife	PHOSPHORUS	Meeting Criteria	2			N			Listed 1998. Delisted 2012. Refined from Nutrients 2024.
DE140-002	Fish, Aquatic Life, and Wildlife	DISSOLVED OXYGEN	Meeting Criteria	2			N			Listed 2002. Delisted 2022.
DE140-002	Primary Contact Recreation	ENTEROCOCCUS	Cause	4A		1996	N			
DE140-002	Fish, Aquatic Life, and Wildlife	NITROGEN	Meeting Criteria	2			Y	Applicable WQS attained; based on new data		Refined from Nutrients 2024. Delisted 2024.
DE140-002	Fish, Aquatic Life, and Wildlife	PHOSPHORUS	Meeting Criteria	2			Y	Applicable WQS attained; based on new data		Refined from Nutrients 2024. Delisted 2024.
DE140-004	Fish, Aquatic Life, and Wildlife	NITROGEN	Cause	4A		1996	N			Refined from Nutrients 2024. Listed 2024 due to dissolved inorganic nitrogen.

Reason to the New Changes (Nutrients to N and P)

- Reporting as nutrients would help in understanding overall lumpsum effects of nitrogen and phosphorus

- Reporting as nitrogen and phosphorus would help in identifying and differentiating N and P problem in the watershed

- In addition, specifying DIN and DIP impacts would help in further clarify overall transport of nutrients and its impact on water quality

Current Condition of Inland Bays' Watershed – Comparison Past Vs Present Assessment

Watershed	Assessment Unit	Year-Parameters	IR Category	Delisting
Buntings Branch	DE070-001	2022-Nutrients	5	
		2024-Nitrogen	2	Y
		2024-Phosphorus	2	Y
Indian River	DE140-004	2022-Nutrients	4A	Refined from Nutrients 2024. Listed 2024 due to dissolved inorganic nitrogen.
		2024-Nitrogen	4A	
		2024-Phosphorus	2	
	DE140-006	2022-Nutrients	4A	
		2024-Nitrogen	2	Y
		2024-Phosphorus	2	Y
	DE140-E02	2022-Nutrients	4A	
		2024-Nitrogen	4A	
		2024-Phosphorus	2	
	DE140-L01	2022-Nutrients	4A	
		2024-Nitrogen	2	Y
		2024-Phosphorus	2	Y

Current Condition of Inland Bays' Watershed – Comparison Past Vs Present Assessment

Watershed	Assessment Unit	Year-Parameters	IR Category	Delisting
Indian R Bay	DE140-002	2022-Nutrients	4A	
		2024-Nitrogen	2	Y
		2024-Phosphorus	2	Y
	DE140-003	2022-Nutrients	4A	
		2024-Nitrogen	2	Y
		2024-Phosphorus	2	Y
	DE140-E01	2022-Nutrients	4A	
		2024-Nitrogen	2	Y
		2024-Phosphorus	4A	
	DE180-001	2022-Nutrients	2	
		2024-Nitrogen	2	
		2024-Phosphorus	2	

Current Condition of Inland Bays' Watershed – Comparison Past Vs Present Assessment

Watershed	Assessment Unit	Year-Parameters	IR Category	Delisting
Little Assawoman Bay	DE180-002-02	2022-Nutrients	4A	
		2024-Nitrogen	2	Y
		2024-Phosphorus	2	Y
	DE180-003-01	2022-Nutrients	4A	
		2024-Nitrogen	4A	
		2024-Phosphorus	2	Y
	DE180-E01	2022-Nutrients	2	
		2024-Nitrogen	2	
		2024-Phosphorus	2	
L-R Canal	DE170-001	2022-Nutrients	4A	
		2024-Nitrogen	2	Y
		2024-Phosphorus	4A	
Iron Branch	DE150-001-01	2022-Nutrients	4A	
		2024-Nitrogen	2	Y
		2024-Phosphorus	2	Y

Thank you!