



Harvey Cedars Meeting

Bob Schuster, NJDEP Marine Water
Monitoring 10/7/2022



Background

- Dissolved Oxygen in the water is needed to support sea life, levels below 4 mg/L can stress fish, below 2 mg/L is lethal.
- The amount of oxygen water can hold is dependent on the water temperature and algae biomass present (macro and water column).
- Bunker are schooling fish and when in large pods can reduce oxygen levels within the pod, stressing or killing the fish in the middle.
- Most fish kills are the result of low oxygen concentrations.
- Other factors can be fish parasites or disease that could be related to temperature.
- What was different in 2022?

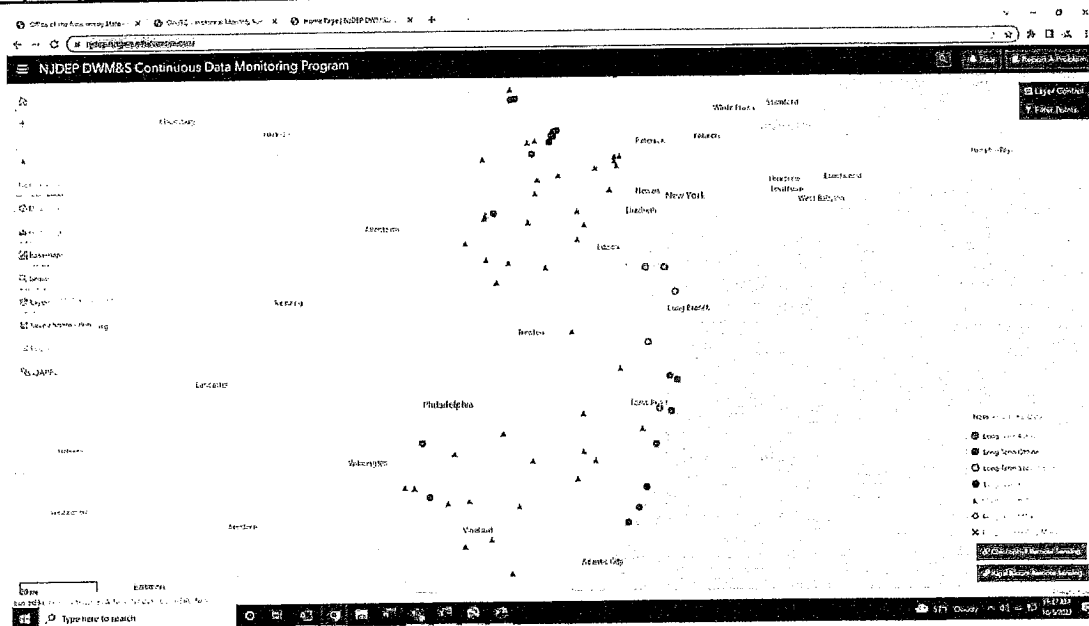
2022 Air Temperature

- Office of the New Jersey State Climatologist reports for Ocean County:
 - July had the fifth highest average air temperature since 1895
 - August had the highest ever recorded average air temperature since 1895

Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	
2017	37.5	41.7	39.7	55.6	60.2	70.6	76	71.9	68.6	60.8	45.5	34.4	55.2
2018	30.6	41.1	38.8	48.3	65.2	70.3	76.3	77.7	71.3	57.5	43.9	39	55
2019	33.2	36	40.2	55	63	71.2	78.5	75.3	70.3	59.5	42.6	38.4	55.3
2020	38.8	40.6	47.2	49	59.1	72.2	79.4	76.5	68.4	58.5	50.4	38.4	56.5
2021	35.2	33.9	44.6	52.7	61.3	72.5	76.6	76.8	70	62.2	44.9	42.9	56.1
2022	30.3	37.5	44.8	51.5	63	70.7	78.7	78.2					

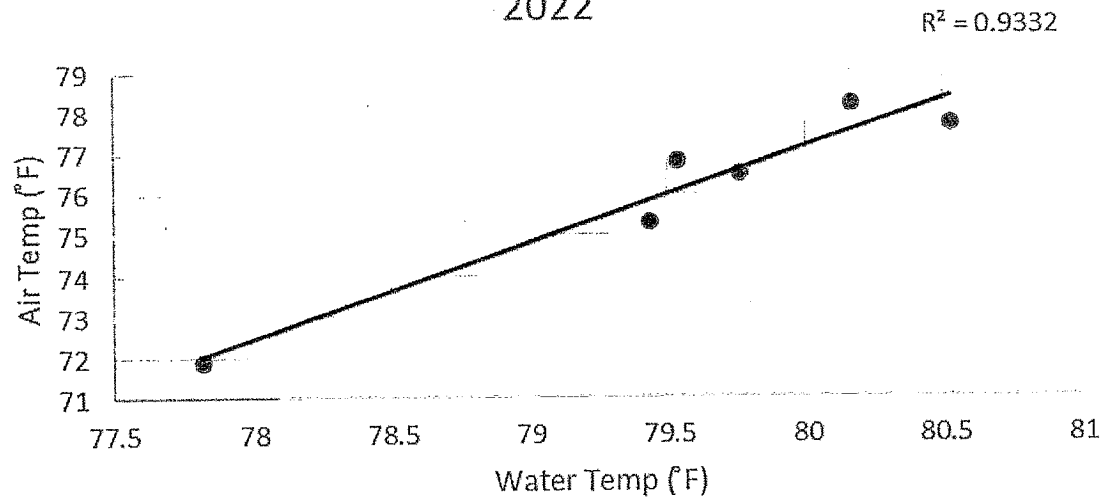
Effect of Air Temp on Water Temp

- Manahawkin Bay Continuous Water Quality Monitoring Buoy looks for dissolved oxygen, pH, salinity, water temperature, turbidity and chlorophyll at 15 minute intervals. <https://njdep.rutgers.edu/continuous/>



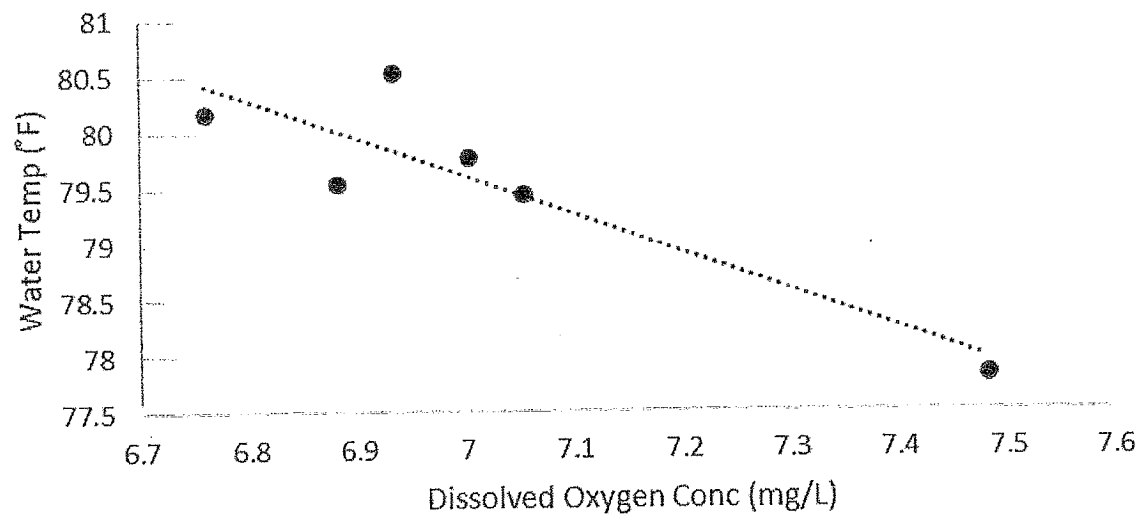
Effect of Air Temp on Water Temp

Manahawkin Bay August Average Water Temperature vs. Average Air Temperature 2017-2022



Effect of Water Temp on Dissolved Oxygen

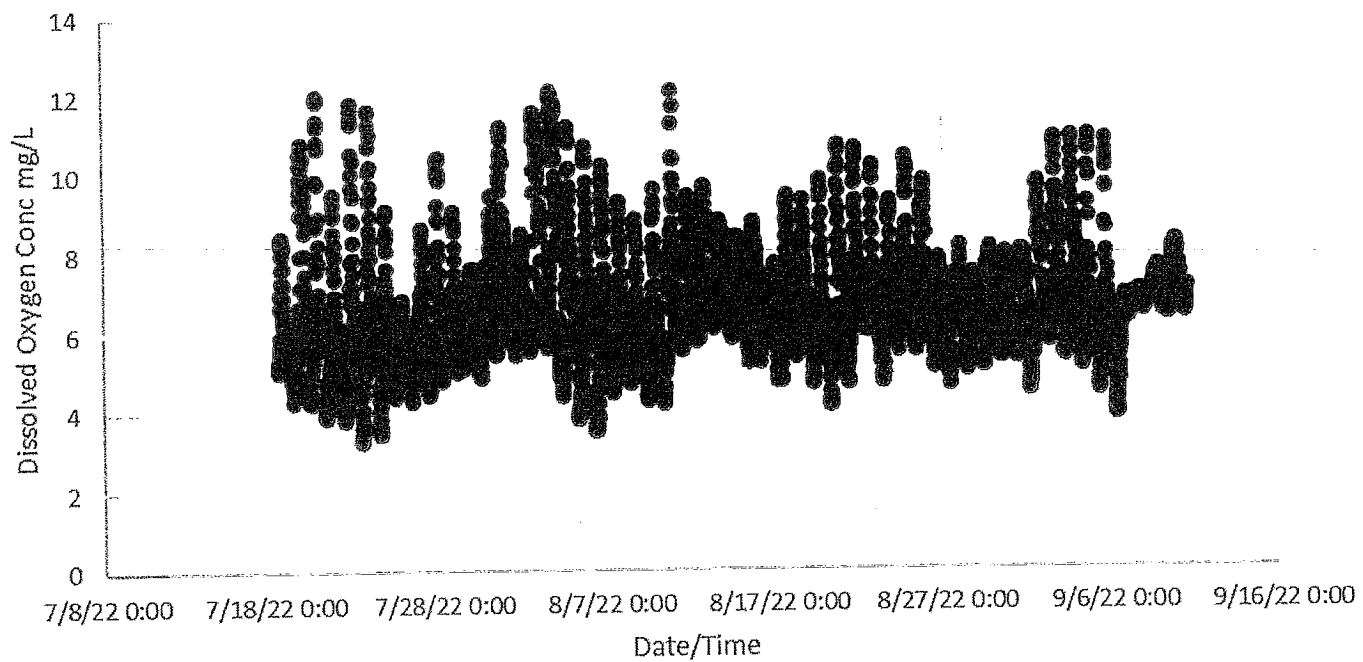
Manahawkin Bay Average Dissolved Oxygen
Conc. vs. Average Water Temperature 2017-2022



Daily Changes in Dissolved Oxygen

- Algae both macro (seaweeds) and phytoplankton (in water) produce oxygen in the daytime due to photosynthesis.
- During the nighttime hours, these same algae consume oxygen, resulting in low oxygen concentrations in the early morning prior to sunrise.

Manahawkin Bay Dissolved Oxygen Data Late July through September



Conclusions

- Open Bay waters experienced episodes of low dissolved oxygen during July and August, in the early morning hours, due to the algal productivity and warmer water temperatures.
- Coves and lagoon areas can experience warmer waters than the open bay; and can exhibit more algae productivity due to reduced water movement.
- Schooling fish can reduce oxygen within the pod, combined with lower oxygen levels due to water temperature and algae productivity depleted oxygen in the area.
- Issue driven by the warm air temperatures experienced in 2022.

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