

1. Introduction

DAERA introduced EFS in 2018, with aims to improve water quality, reduce greenhouse gas emissions, protect soil and prevent erosion and enhance biodiversity (DAERA, 2023). This study investigated the water quality in Lough Neagh (McAleece, 2023) and Breeding Bird Survey numbers (BBS) (Harris, *et al.*, 2023) as a measure of the scheme's effectiveness. The literature review identified that the eutrophication of the lough began in the 1800 and are now at critical levels.

1. Aims and Objectives

- Quantitatively assess breeding bird population changes in priority habitats in NI and water quality in Lough Neagh, for Nitrates and phosphates.
- Align research with NI environmental objectives and sustainable farming practices.
- Recommend potential policy improvements for sustainable agri-environment support in NI.

2. Hypotheses

Null Hypothesis H_0 = That the DAERA EFS 2018 – 2023 has not had a statistically significant effect on the water quality in Lough Neagh and biodiversity in NI, by enhancing habitat management.

Alternative Hypothesis H_1 = That the DAERA EFS 2018 – 2023 has had a statistically significant effect on the water quality in Lough Neagh and biodiversity in NI, by enhancing habitat management.

3. Methodology

The data, collected by NI Environmental Agency, DAERA and BBS, was statistically analysed using Minitab and as annual averages for rainfall and nutrients monitored entering the lough. The BBS data was presented as population trends, the 5 year and 25 year were compared to reflect the implementation of the EFS in 2018.

4. Results

4.1. Biodiversity - There has been a statistically significant difference in bird numbers ($p=0.001$) and specifically in hedgerow species ($p<0.05$).



(Bird Facts, 2024)

4.2. Water Quality Phosphates

There was no statistically significant difference in water quality for phosphates ($p=0.210$) pre and post EFS. The annual averages show similar trends for all monitoring points (figure 1). Sources of phosphate can be attributed to the rising population and detergent ingredients and use (Foy, *et al.*, 2003).



(WRCPurifying, 2024)

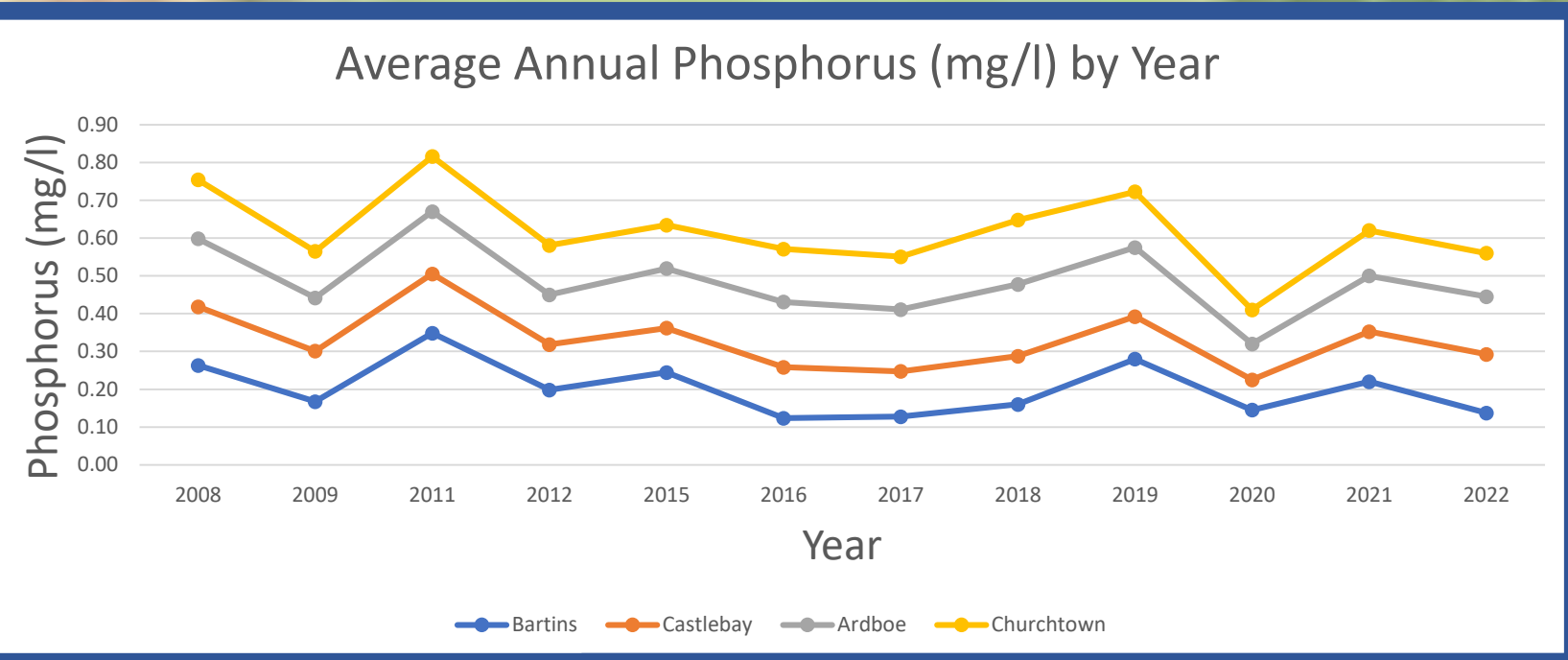


Figure 1. Average Annual Phosphorus

4.3. Water Quality Nitrates

There is a statistically significant difference ($p=0.001$) in the samples pre and post EFS, the annual averages show that this is a negative result (figure 2) and that the nitrates in the lough is rising, but that rainfall has a huge impact on the quantities being flushed into the waterways from all sources, especially agriculture, but exacerbated by the lack of soakage and the increase in run off due to increased urbanisation (Yuan, *et al.*, 2023).

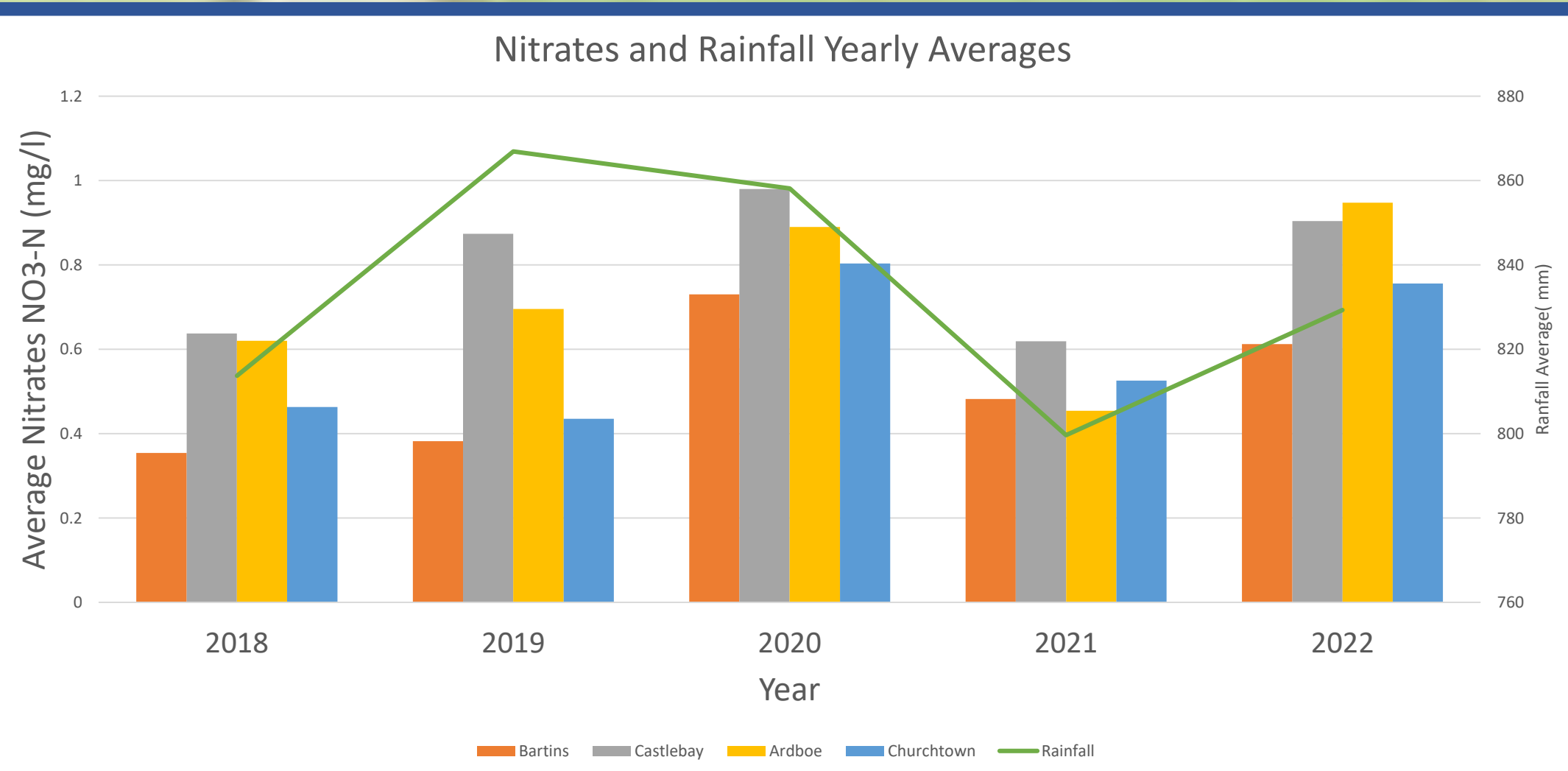


Figure 2 Annual Averages Nitrates and Rainfall

5. Discussion

The improvements to breeding bird numbers could be attributed to the planting of trees and hedgerows under the EFS, as hedgerow species have shown a marked improvement, but the scheme has not succeeded in improving water quality, as the scattergun approach to protection did not cover all waterways in the collection areas. The Source to Tap Scheme by NI Water in 2022 demonstrated that by targeting all waterways in the River Derg catchment basin, granting up to £20,000 upfront payment for fencing and weed wiping, gave a £3.36 benefit in reduced processing charges for every £1 invested (Foster, 2022). The EFS replacement scheme - Farming with Nature has similar goals but less regulation and more self-assessment (Anderson, 2024).

6. Conclusion

Future governmental investment in agriculture will have to show an ongoing environmental benefit. Schemes should be targeted for more complete protection of waterways for maximum effect on water quality. Additional population monitoring of endangered wader birds, as no data is available for NI, that the breeding areas, identified in the higher scheme, be more efficiently managed.

7. References

Anderson, C. (2024, February 14). DAERA FwN Pilot Recruitment Presentation. Belfast, Northern Ireland.

Bird Facts. (2024). *Song Thrush*. Retrieved from Bird Facts: <https://birdfact.com/birds/song-thrush>

DAERA. (2023, May). *DAERA Environmental Statistics Report*. Retrieved from DAERA: <https://www.daera-ni.gov.uk/sites/default/files/publications/daera/ni-environmental-statistics-report-2023.pdf>

Foster, D. (2022). *A Watershed Moment*. Enniskillen: Interreg.

Foy, R. H., Lennox, S. D., & Gibson, C. E. (2003). Changing perspectives on the importance of urban phosphorus inputs as the cause of nutrient enrichment in Lough Neagh. *Science of The Total Environment*, 87 - 99.

Googlemaps. (2024). *Googlemaps*. Retrieved from Googlemaps: <https://www.google.co.uk/maps/>

Harris, S. J., Massimino, D., Balmer, D. E., Kelly, L., Noble, D. G., Pearce-Higgins, J. W., . . . Gillings, S. (2022). *The Breeding Bird Survey 2021*. Thetford: British Trust for Ornithology.

McAleece, M. (2024, January 4). NIEA Water Sampling. (D. Course, Interviewer)

WRCPurifying. (2024). *Water Analysis*. Retrieved from WRCPurifying: <https://www.wrcpurifying.com/services/water-analysis/>

Yuan, W., Liu, Q., Song, S., Lu, Y., Yang, S., Fang, Z., & Shi, Z. (2023). A climate-water quality assessment framework for quantifying the contributions of climate change and human activities to water quality variations. *Journal of Environmental Management*.