Juvenile Fish Survey
Data Summary
To Spring 2023

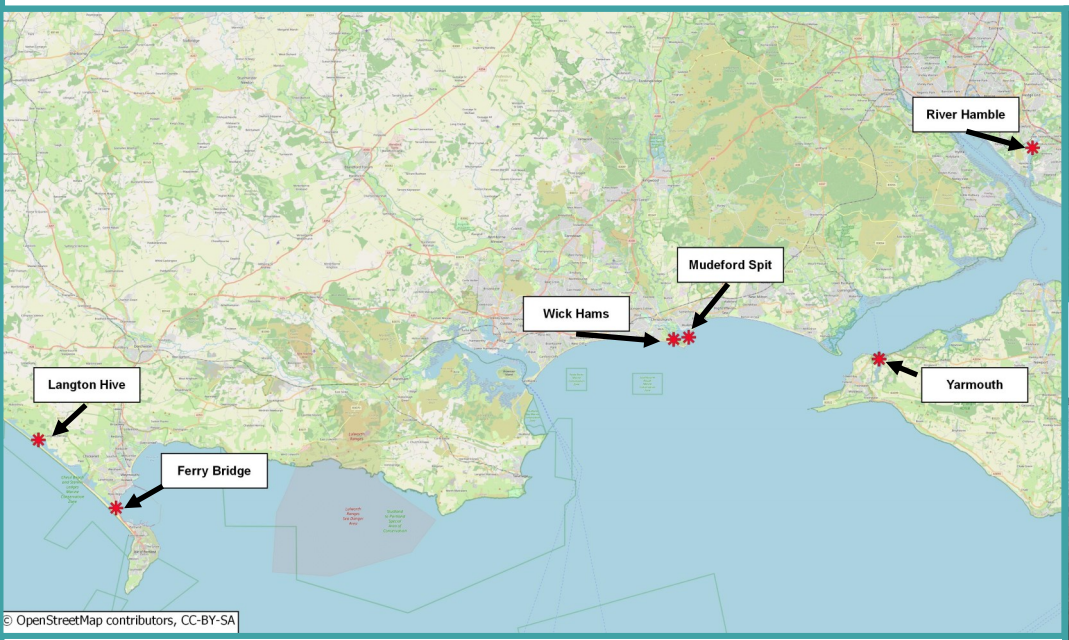
Purpose

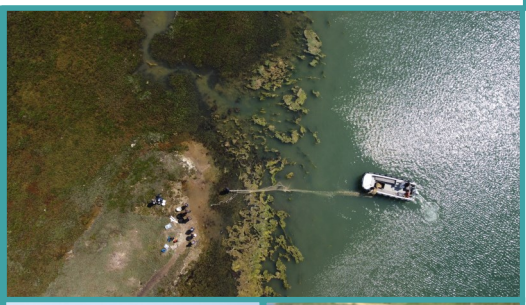
Estuaries and sheltered coastal habitats provide a range of ecosystem services and are known for their high productivity and biodiversity. They offer suitable habitats for juvenile fish as nursery areas as well as species throughout their lifecycle for feeding, spawning and refuge. As part of the Southern IFCA Inshore Netting Review, Southern IFCA determined to enhance the environmental, socio-economic and sustainability of fisheries within the District by supporting the use of harbours and estuaries by fish populations for these purposes, collectively referring to the areas as Essential Fish Habitats (EFH).

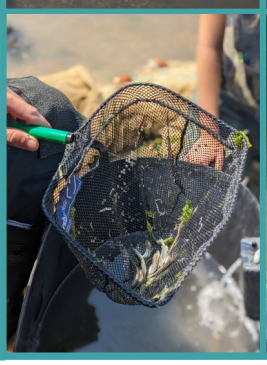
As part of the Southern IFCA's Fish Monitoring Programme, surveys are carried out at a range of sites across the District in order to understand the use of these EFH by commercial and recreational fish species. Building a time-series dataset will allow any changes in fish communities to be observed to help understanding of EFH, contributing to a database that can be used for reviewing fisheries management.

Method

1. Southern IFCA Carry out Juvenile Fish Surveys in Spring and Autumn each year.
2. A 43 meter seine net is used to sample fish, deployed either by hand or using a vessel depending on location.
3. The net is set in a semi-circle from the shore and is recovered to the shore with any fish retained placed in aerated buckets.
4. The length of the first 50 fish of each species is measured (tail length) and carefully returned to the sea as quickly as possible.
5. Any remaining fish of each species are counted and returned to the sea.
6. The net is shot and hauled twice at each survey site.





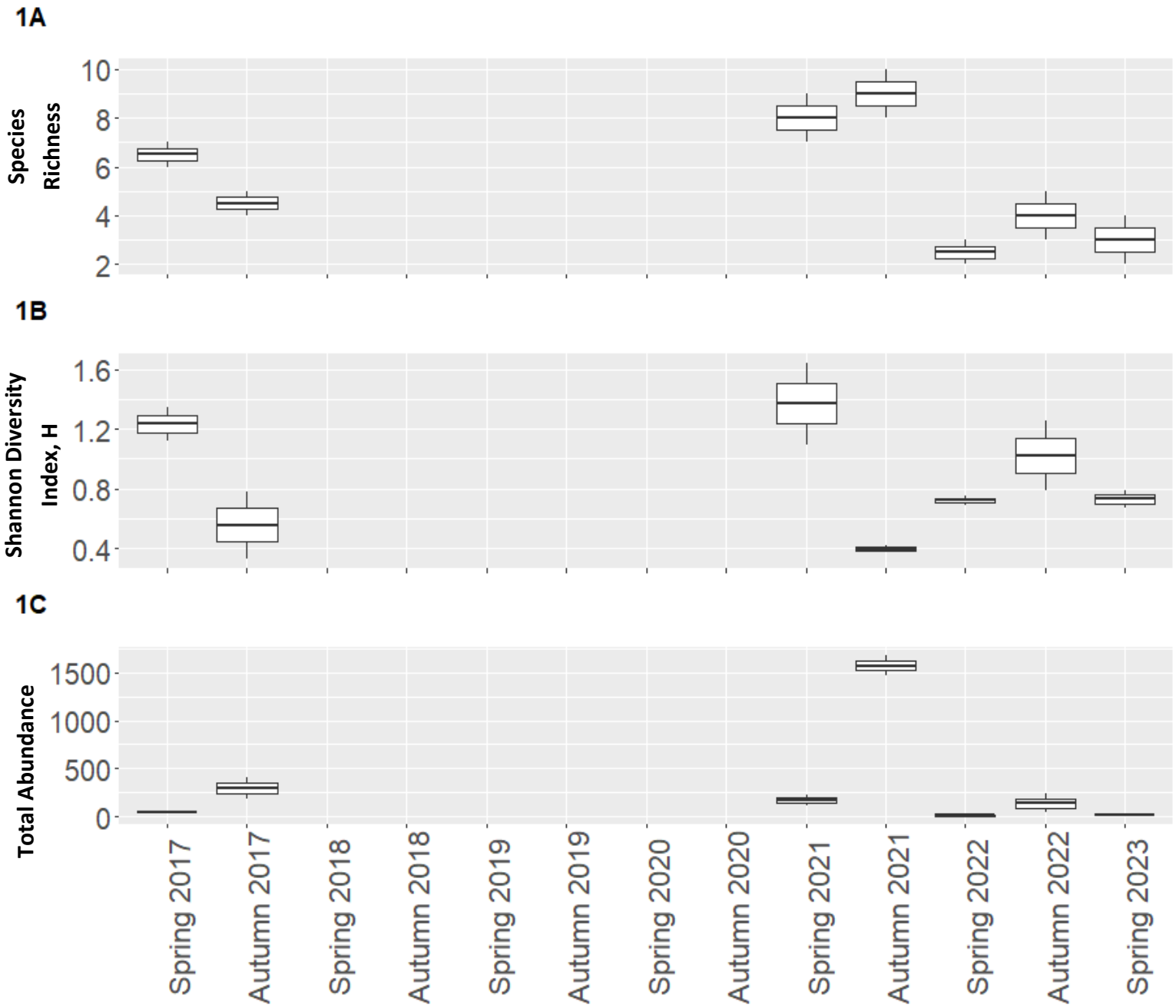


- Data was used to calculate the total species abundance, relative species abundance, species richness and Shannon Diversity Index (H).
- It should be noted that for species richness and H; where difficulties in identifying species occurred, all variations were combined as one species. Therefore, the species richness and H should be viewed as conservative.
- H considers both the abundance of each species and the balance of abundance between all species, also known as the species evenness. A larger H represents a more diverse community.

Partnership Working

Southern IFCA's juvenile fish surveys would not be possible without the help, permissions, resources and knowledge of multiple organisations. Thank you to the representatives of the following organisations for their help with the 2023 Spring surveys.

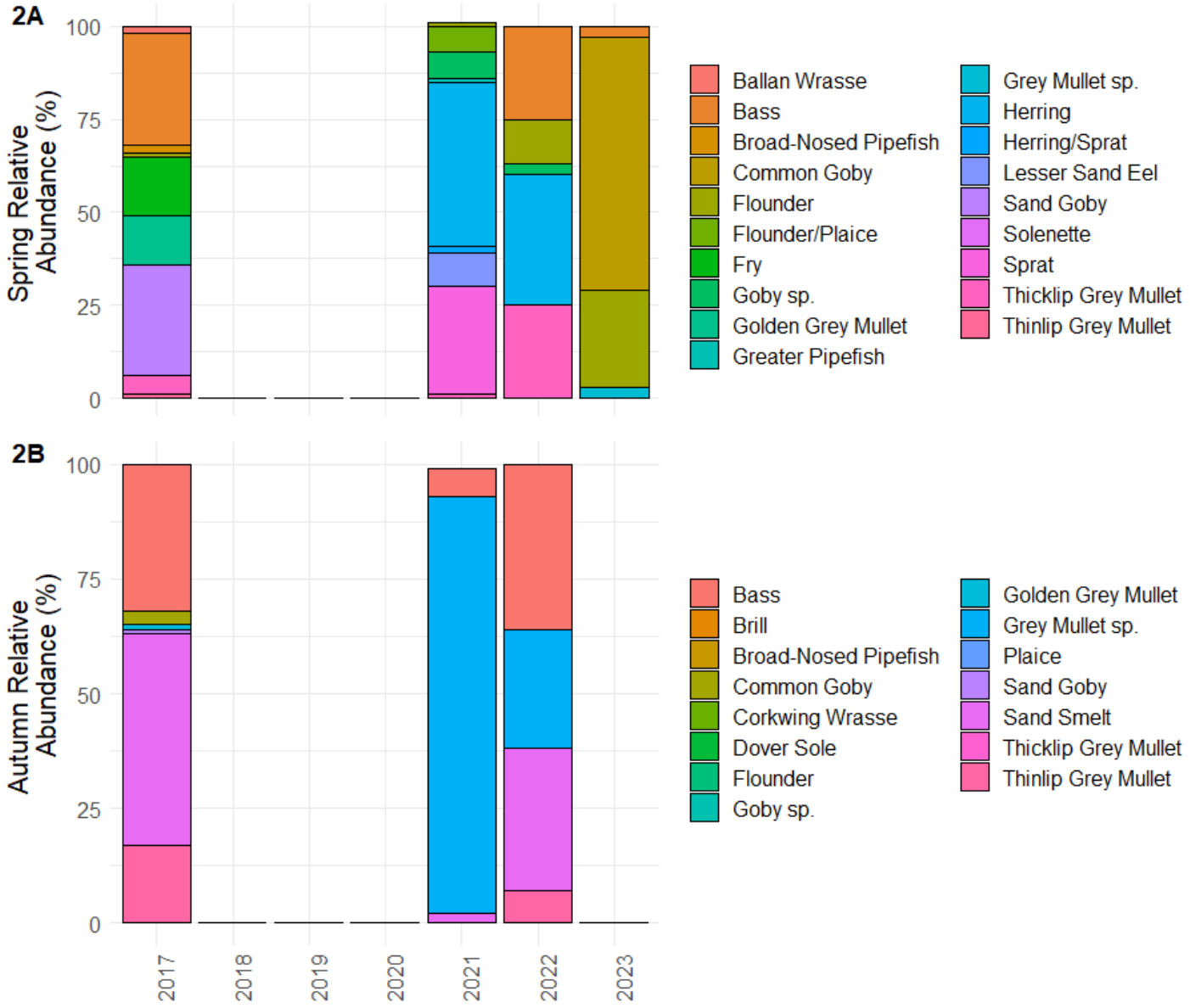
Mudeford Spit (Christchurch Harbour)



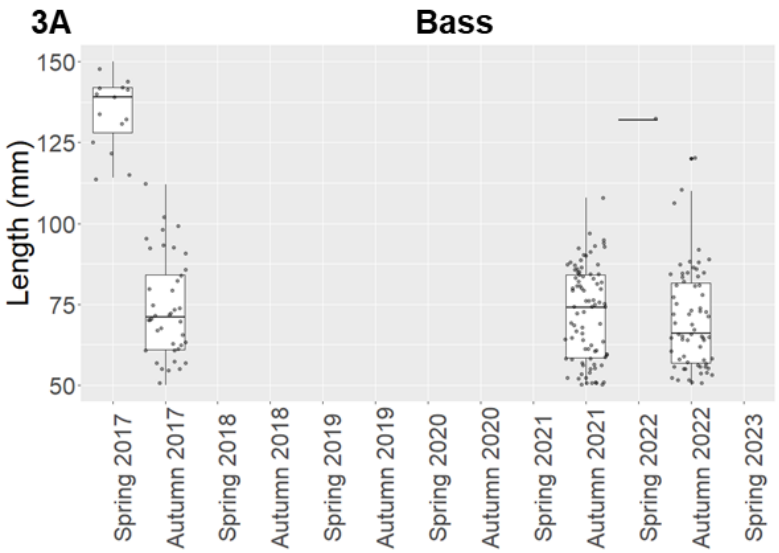
- Figures 1A,1B and 1C display the Species Richness, Shannon Diversity Index (H) and total abundance in each survey for the Mudeford Spit (Christchurch Harbour) site carried out between Spring 2017 and Spring 2023.
- Species richness was highest in Autumn 2021 (9) and Spring 2021 (8) and lowest in Autumn 2022 (4) and spring 2022 (2.5). No survey has a significantly different species richness to another ($p > 0.05$).
- Autumn 2021 displayed a lower Shannon Diversity index (H) than Spring 2021 due to the high dominance of Grey Mullet sp (Figures 2A & 2B). No survey has a significantly different H to another ($p > 0.05$).
- Of the spring surveys, 2021 had the highest total abundance of fish (173) and 2023 the lowest (14). Of the autumn surveys, 2021 had the highest total abundance of fish (1575) and 2022 the lowest (11). No survey has a significantly different total abundance to another ($p > 0.05$).
- There is no statistical difference between the species richness, Shannon Diversity Index or total abundance between spring and autumn (table to the right).

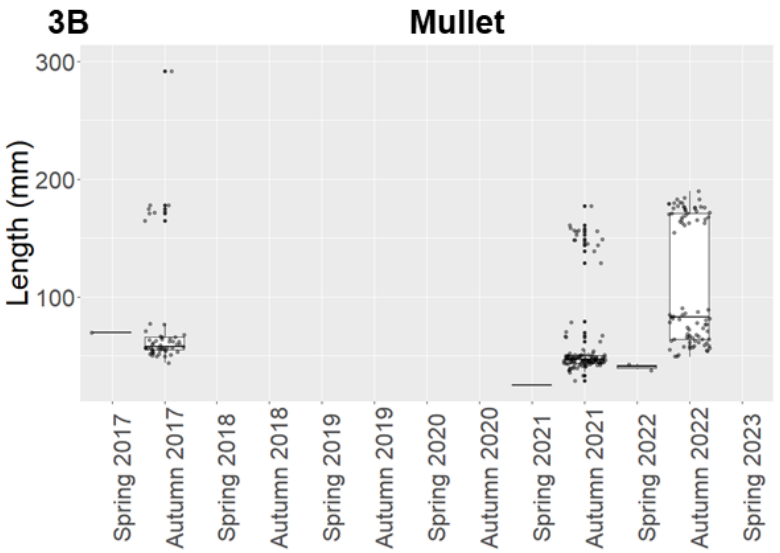
	Spring	Autumn	P<0.05
Mean Species Richness	5	5.8	No
Mean Shannon Diversity Index	1.01	0.66	No
Mean Total Abundance	61	670	No

Mudeford Spit (Christchurch Harbour)



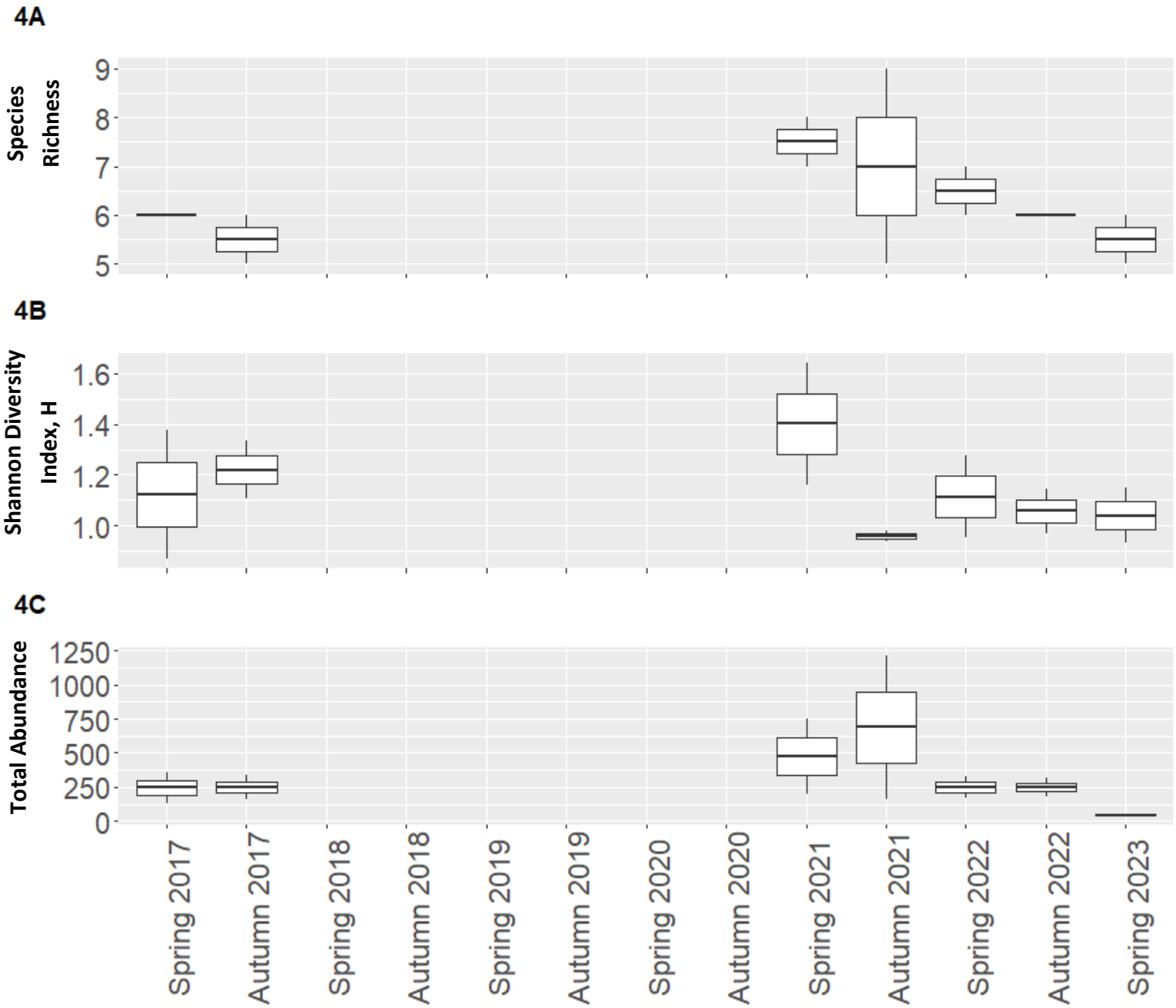
- Figures 2A (spring) and 2B (autumn) display the percentage relative abundance of each species during each survey.





- Figure 3A and 3B display the measured length of Bass and all Mullet species, only Bass and Mullet are displayed due to their commercial importance within the Southern IFCA district.
- All Grey Mullet sp. have been combined for Figure 3B due to difficulties in identifying the species as juveniles, however 3B displays distinct groups of sizes, which could be related to the presence of the different species.

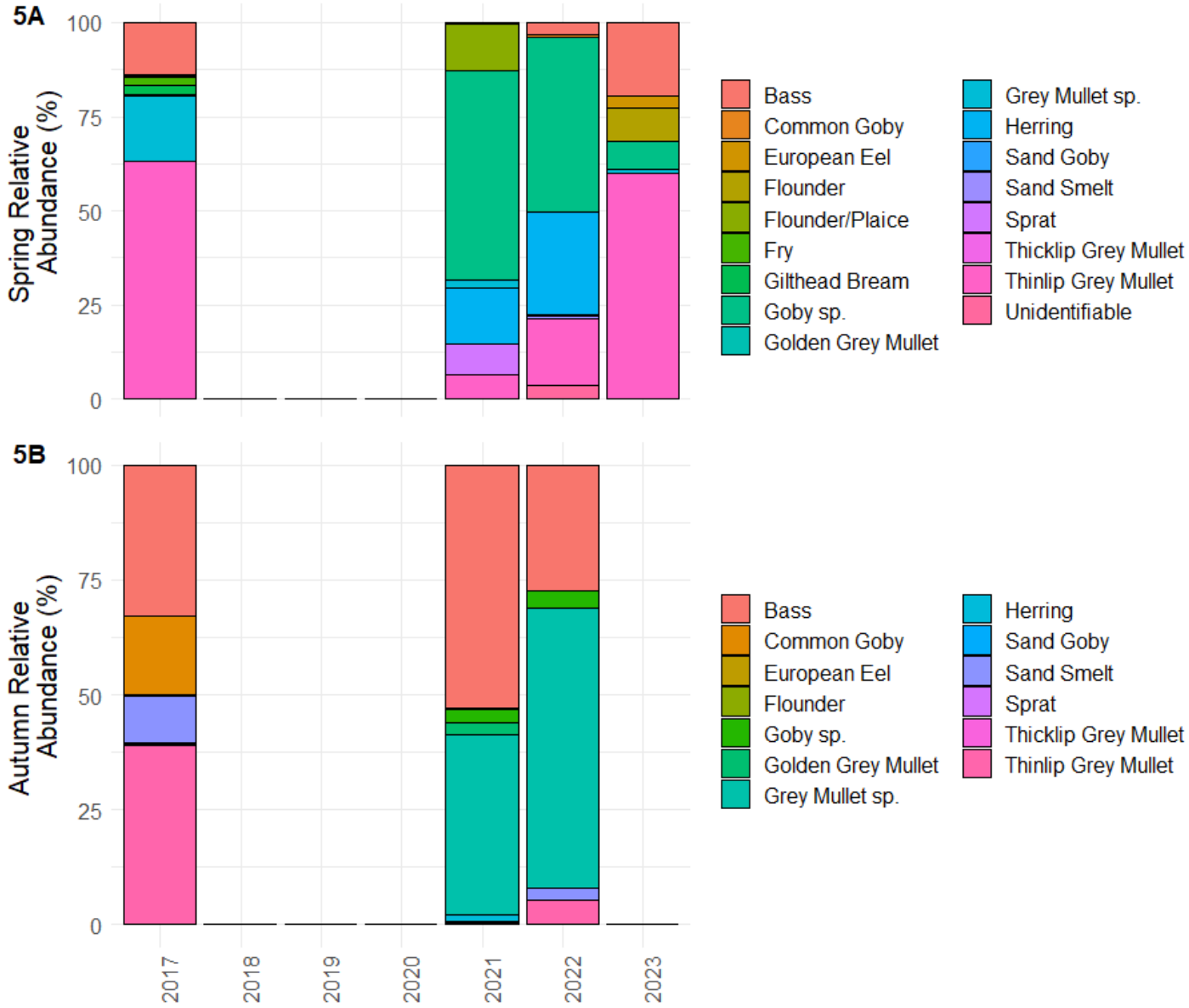
Wick Hams (Christchurch Harbour)



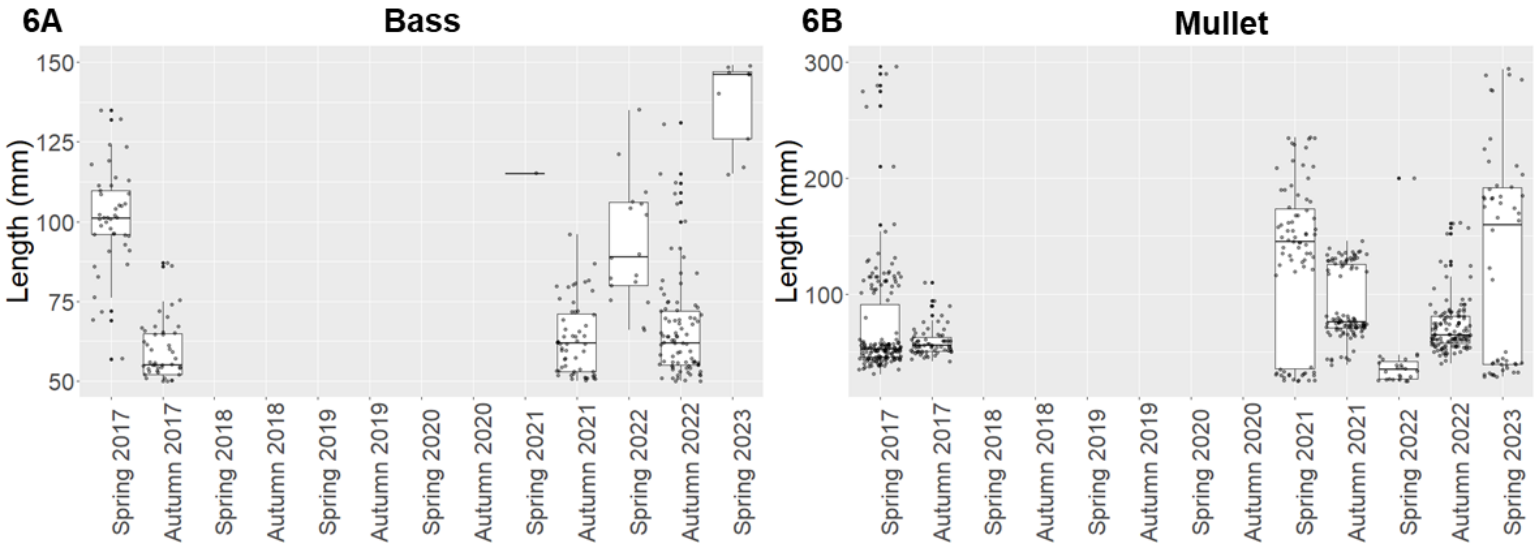
- Figures 4A,4B and 4C display the Species Richness, Shannon Diversity Index (H) and total abundance in each survey for the Wick Hams (Christchurch Harbour) site carried out between Spring 2017 and Spring 2023.
- Mean species richness was highest in Autumn 2021 (7) and Spring 2021 (7.5) and lowest in Autumn 2017 (4) and Spring 2023 (4). No survey has a significantly different species richness to another ($p > 0.05$).
- No survey has a significantly different H to another ($p > 0.05$). Of the Spring Surveys, 2021 had the highest mean H (1.40) and of the Autumn surveys, 2017 had the highest mean H (1.22).
- Of the spring surveys, 2021 had the highest mean total abundance of fish (476) and 2023 the lowest (46). Of the autumn surveys, 2021 had the highest total abundance of fish (687) with 2017 and 2022 equal lowest (250) .No survey has a significantly different total abundance to another ($p > 0.05$).
- There is no statistical difference between the species richness, Simpsons Diversity Index or total abundance between spring and autumn (table to the right).

	Spring	Autumn	P<0.05
Mean Species Richness	6.4	6.2	No
Mean Simpsons Diversity Index	1.17	1.08	No
Mean Total Abundance	254	396	No

Wick Hams (Christchurch Harbour)

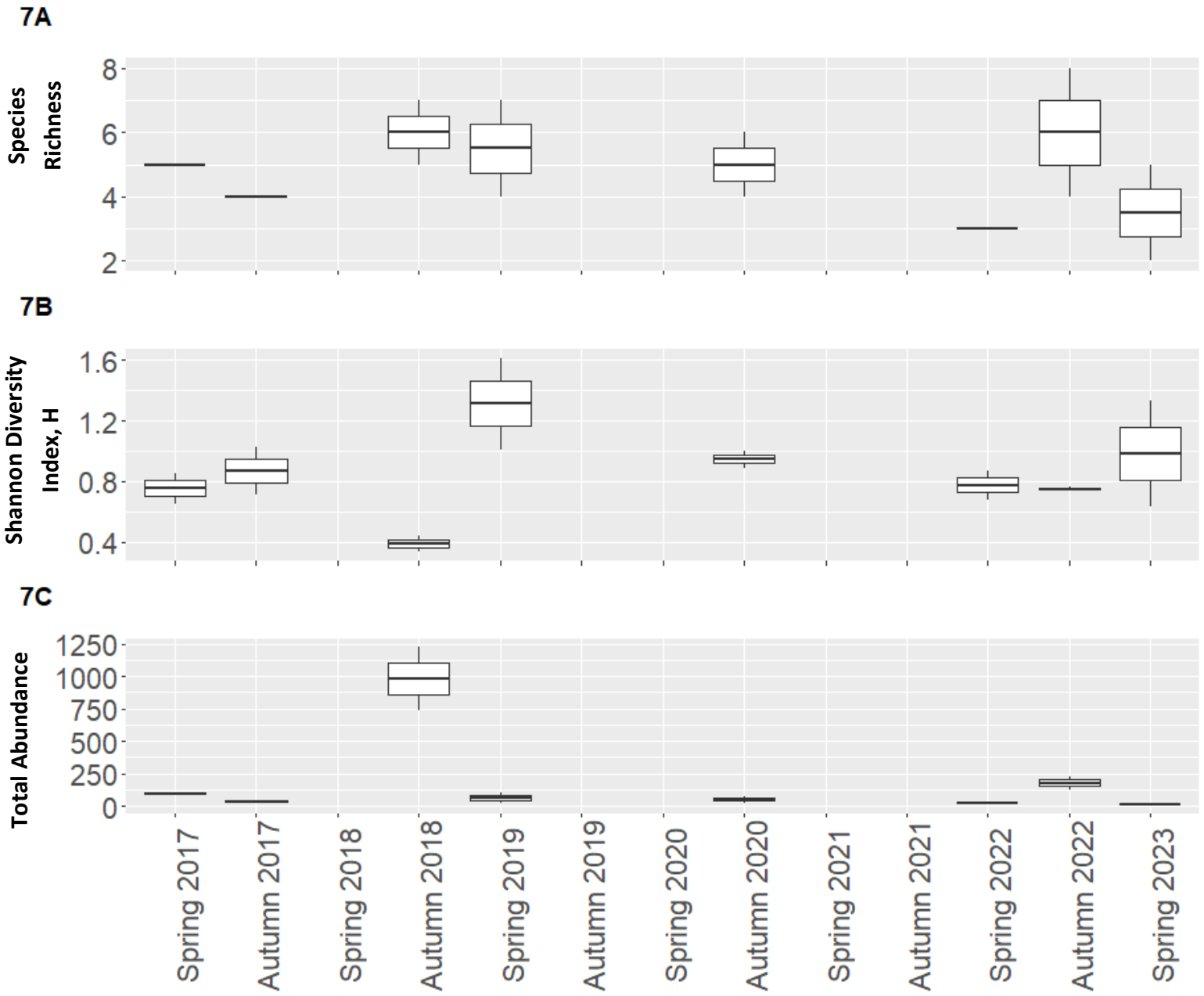


- Figures 5A (spring) and 5B (autumn) display the percentage relative abundance of each species during each survey.



- Figure 6A and 6B display the measured length of Bass and all Mullet species; only Bass and Mullet are displayed due to their commercial importance within the Southern IFCA district.
- All Grey Mullet sp. have been combined for Figure 6B due to difficulties in identifying the species as juveniles. Similarly to Mudeford Spit, Wick Hams displays distinct groups of sizes for Mullet sp. (figure 6B), which could be related to the presence of the different species.

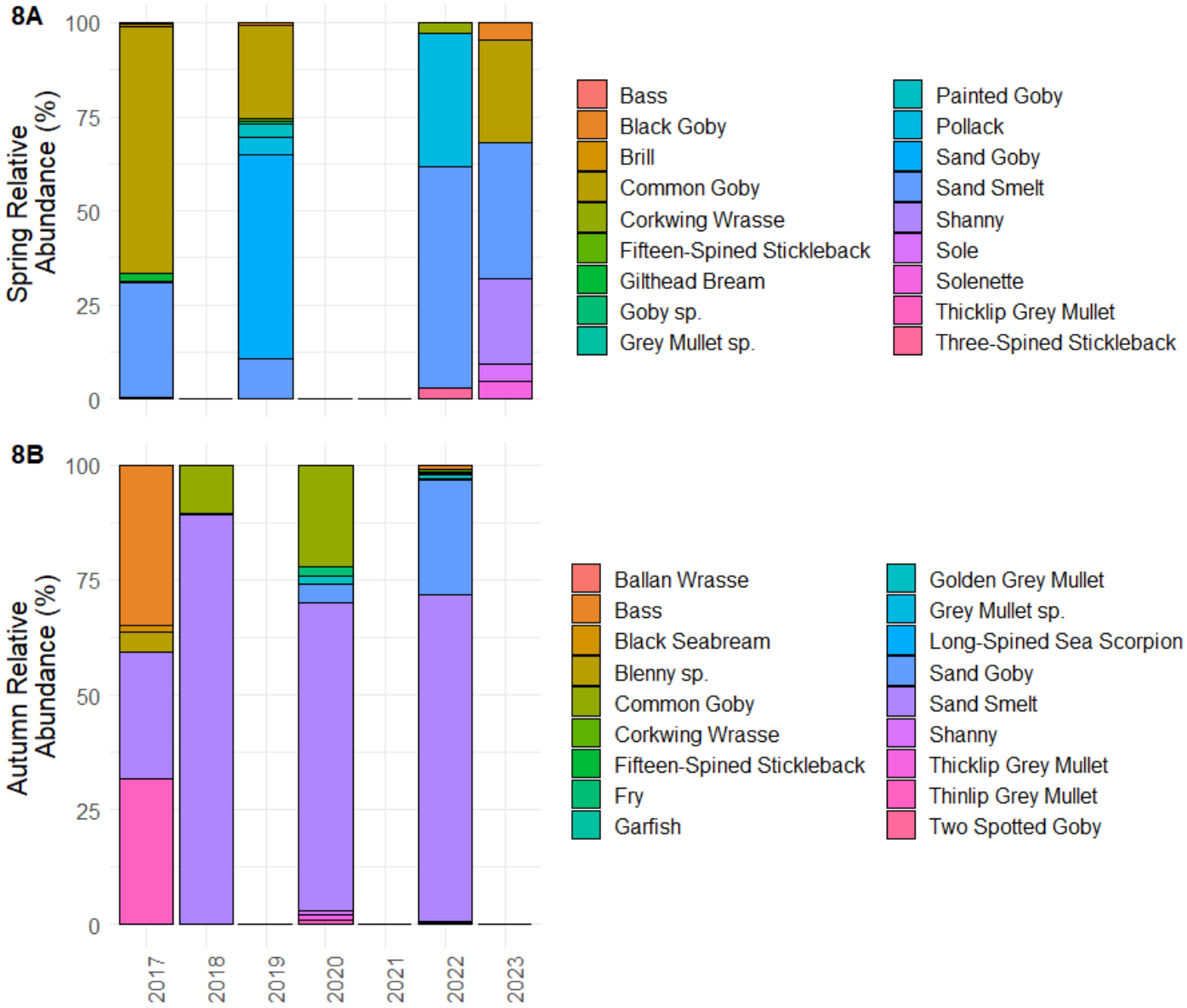
Ferry Bridge (The Fleet)



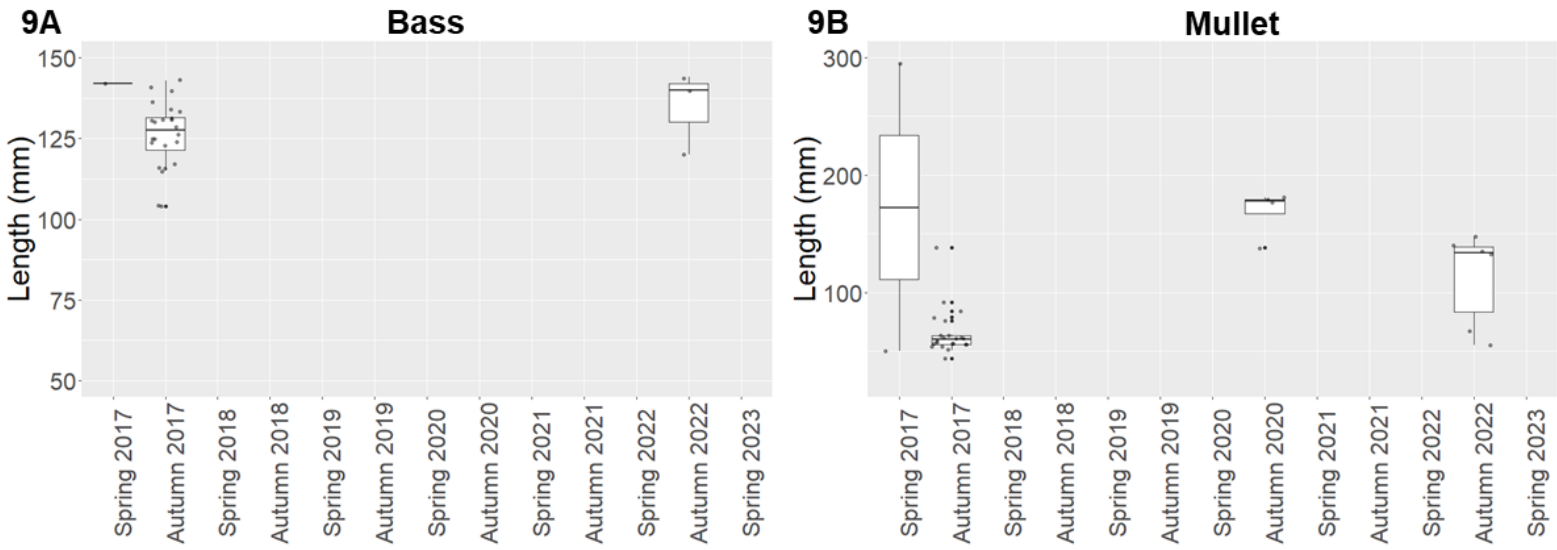
- Figures 7A,7B and 7C display the Species Richness, Shannon Diversity Index (H) and total abundance in each survey carried out for the Ferry Bridge (The Fleet) site between Spring 2017 and Spring 2023.
- Of the Autumn surveys mean species richness was equal highest in Autumn 2018 and 2022 (6) and lowest in Autumn 2017 (4). Of the Spring surveys 2019 (5.5) was highest and lowest in 2022 (3). No survey has a significantly different species richness to another ($p > 0.05$).
- No survey has a significantly different H to another $p > 0.05$. Of the Spring Surveys, 2019 had the highest mean H (1.31) and of the Autumn surveys, 2020 had the highest mean H (0.94)
- Of the spring surveys, 2017 had the highest mean total abundance of fish (98) and 2023 the lowest (11). Of the autumn surveys, 2018 had the highest total abundance of fish (980) and 2020 the lowest (35). The Autumn 2018 survey had a significantly higher mean total abundance of fish than all other surveys ($p>0.05$).
- There is no statistical difference between the species richness, Simpsons Diversity Index or total abundance between spring and autumn (table to the right).

	Spring	Autumn	P<0.05
Mean Species Richness	4.25	5.25	No
Mean Simpsons Diversity Index	0.96	0.74	No
Mean Total Abundance	47	311	No

Ferry Bridge (The Fleet)

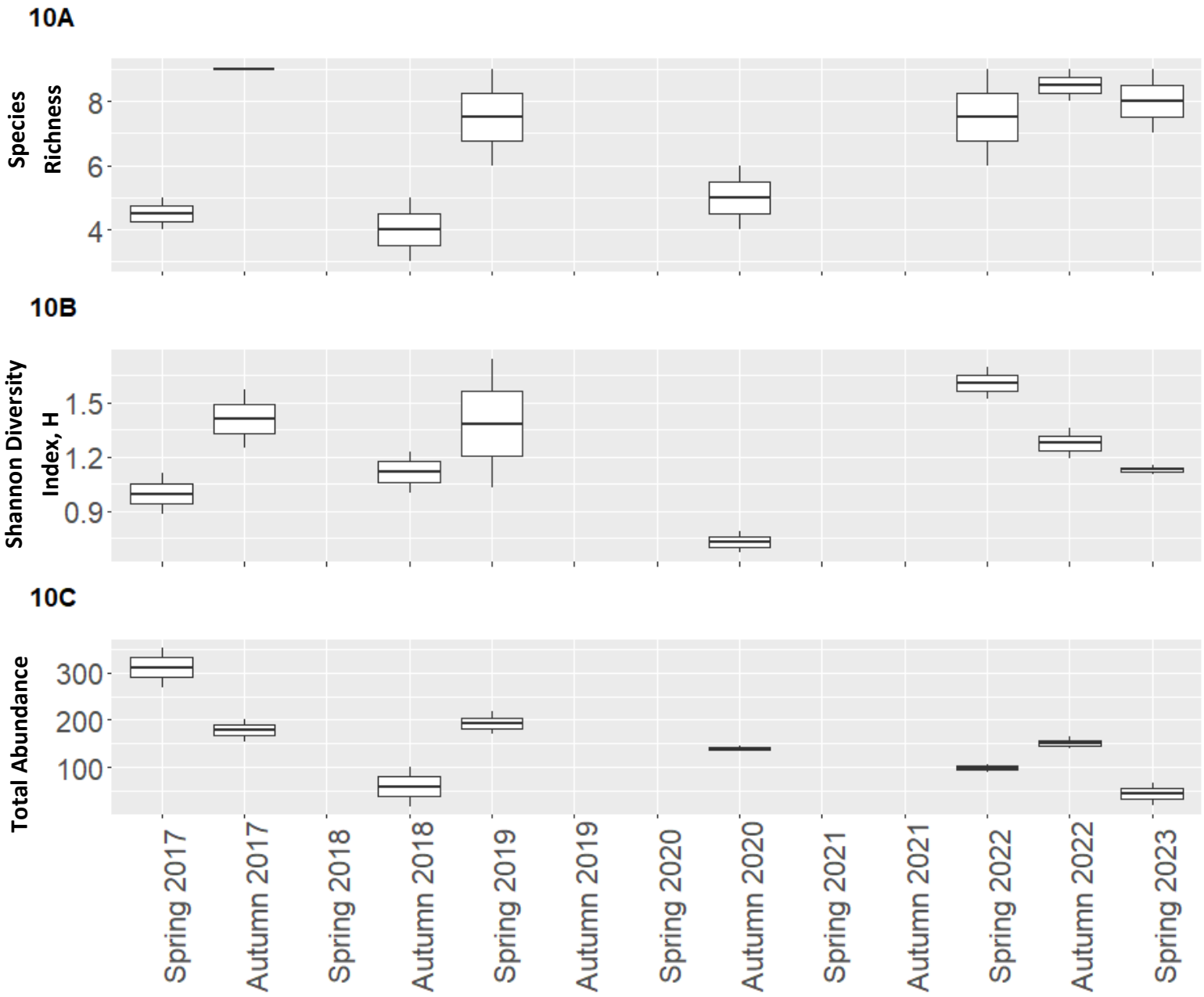


- Figures 8A (spring) and 8B (autumn) display the percentage relative abundance of each species during each survey.



- Figure 9A and 9B display the measured length of Bass and all Mullet species; only Bass and Mullet are displayed due to their commercial importance within the Southern IFCA district.
- All Grey Mullet sp. have been combined for Figure 9B due to difficulties in identifying the species as juveniles.

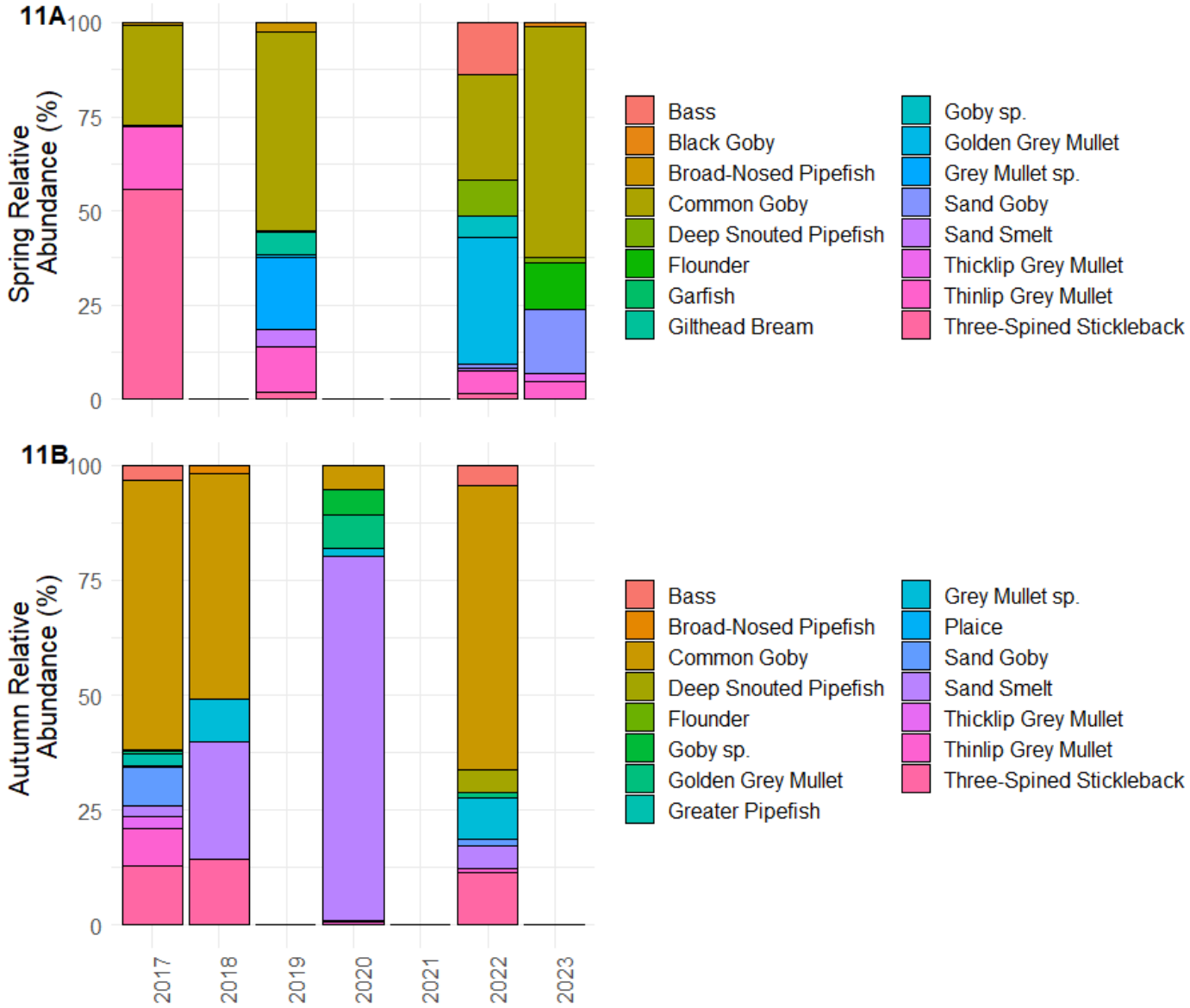
Langton Hive (The Fleet)



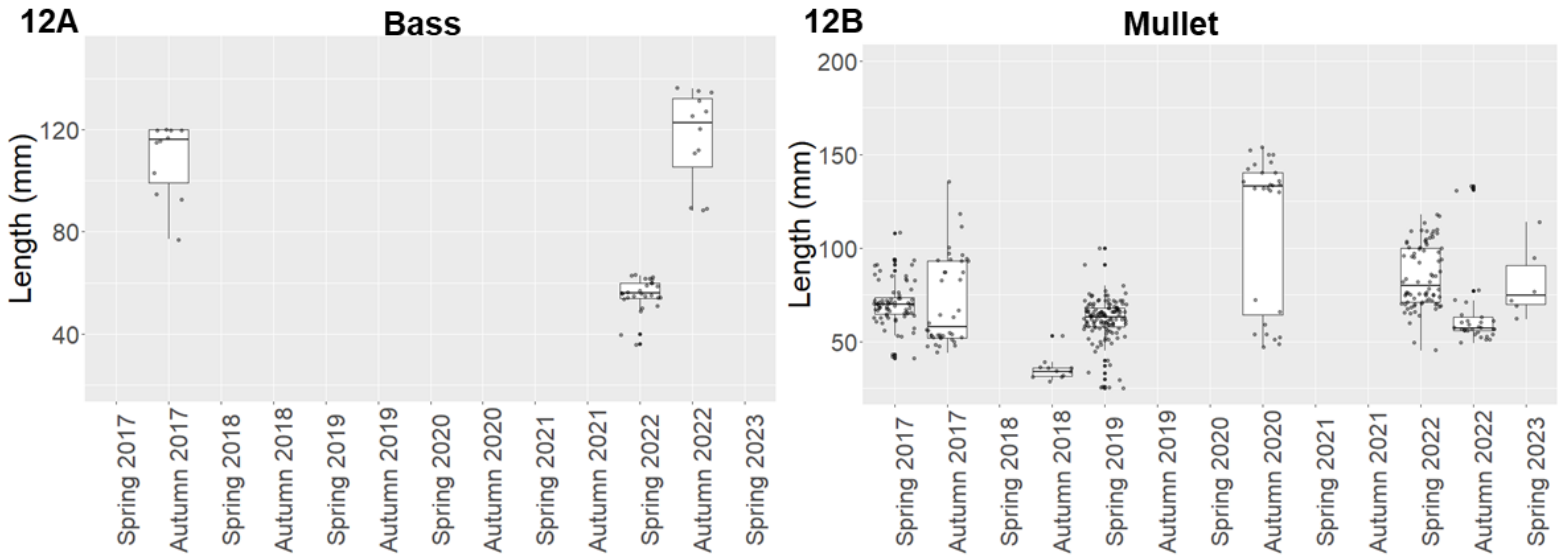
- Figures 10A,10B and 10C display the Species Richness, Shannon Diversity Index (H) and total abundance in each survey for the Langton Hive (The Fleet) site carried out between Spring 2017 and Spring 2023.
- Of the Autumn surveys mean species richness was equal highest in Autumn 2017 (9) and lowest in Autumn 2018 (4). Of the Spring surveys 2023 (8) was highest and lowest in 2017 (4.5). An ANOVA found a significant difference ($p<0.05$) between the surveys however the following post-hoc Tukey test did not show a difference indicating there is more variation within each survey than between surveys.
- No survey has a significantly different H to another $p > 0.05$. Of the Spring Surveys, 2022 had the highest mean H (1.61) and of the Autumn surveys, 2017 had the highest mean H (1.41).
- Of the spring surveys, 2017 had the highest mean total abundance of fish (311) and 2023 the lowest (44). 2017 for the Autumn surveys had the highest total abundance of fish (178) and 2018 the lowest (59). There is no significant difference in total abundance between any surveys.
- There is no statistical difference between the species richness, Simpsons Diversity Index or total abundance between spring and autumn (table to the right).

	Spring	Autumn	P<0.05
Mean Species Richness	6.87	6.89	No
Mean Simpsons Diversity Index	1.28	1.11	No
Mean Total Abundance	162	147	No

Langton Hive (The Fleet)

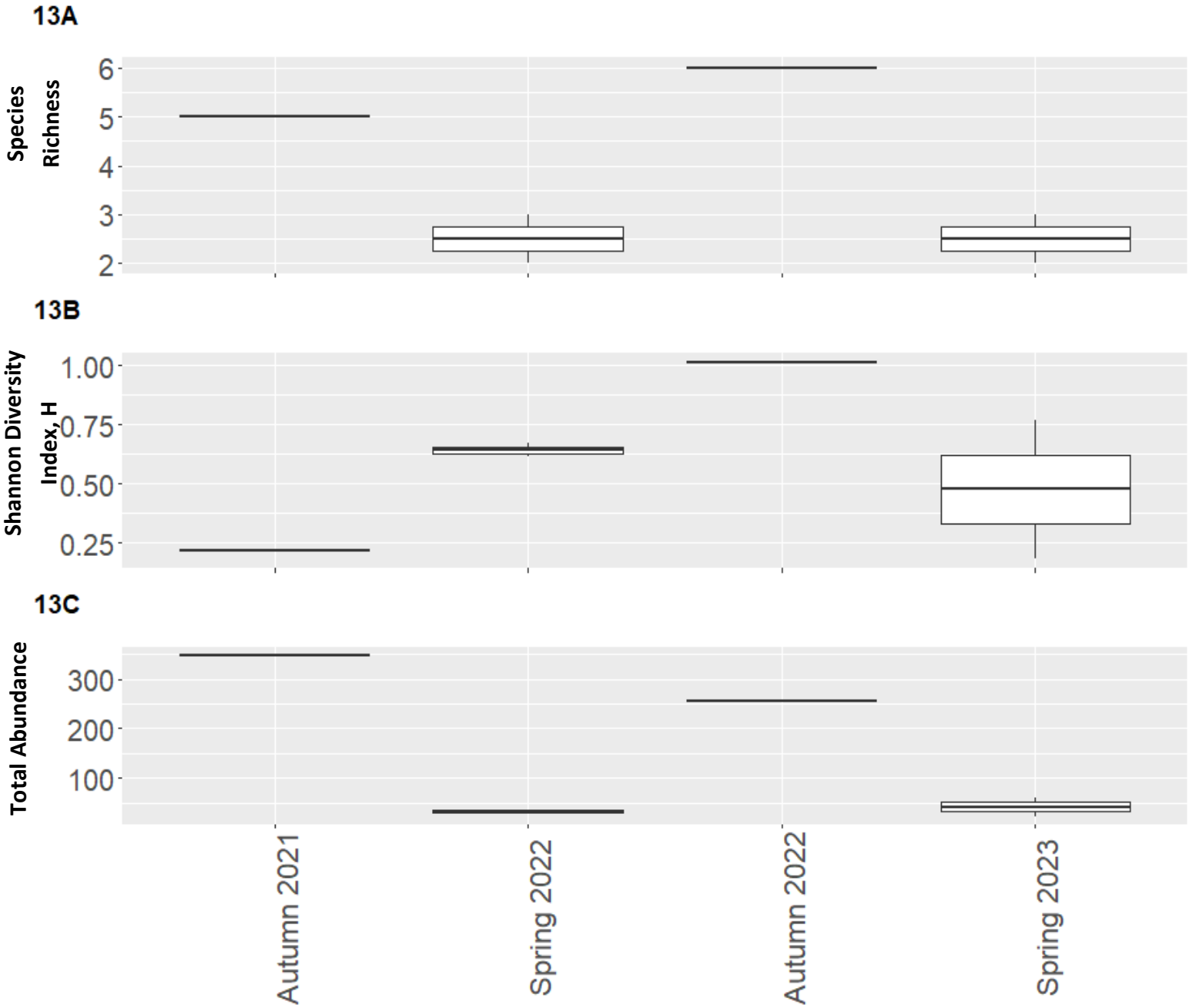


- Figures 11A (spring) and 11B (autumn) display the percentage relative abundance of each species during each survey.



- Figure 12A and 12B display the measured length of Bass and all Mullet species; only Bass and Mullet are displayed due to their commercial importance within the Southern IFCA district.
- All Grey Mullet sp. have been combined for Figure 12B due to difficulties in identifying the species as juveniles. Figure 12B displays distinct groups of sizes for Grey Mullet sp., which could be related to the presence of the different species.

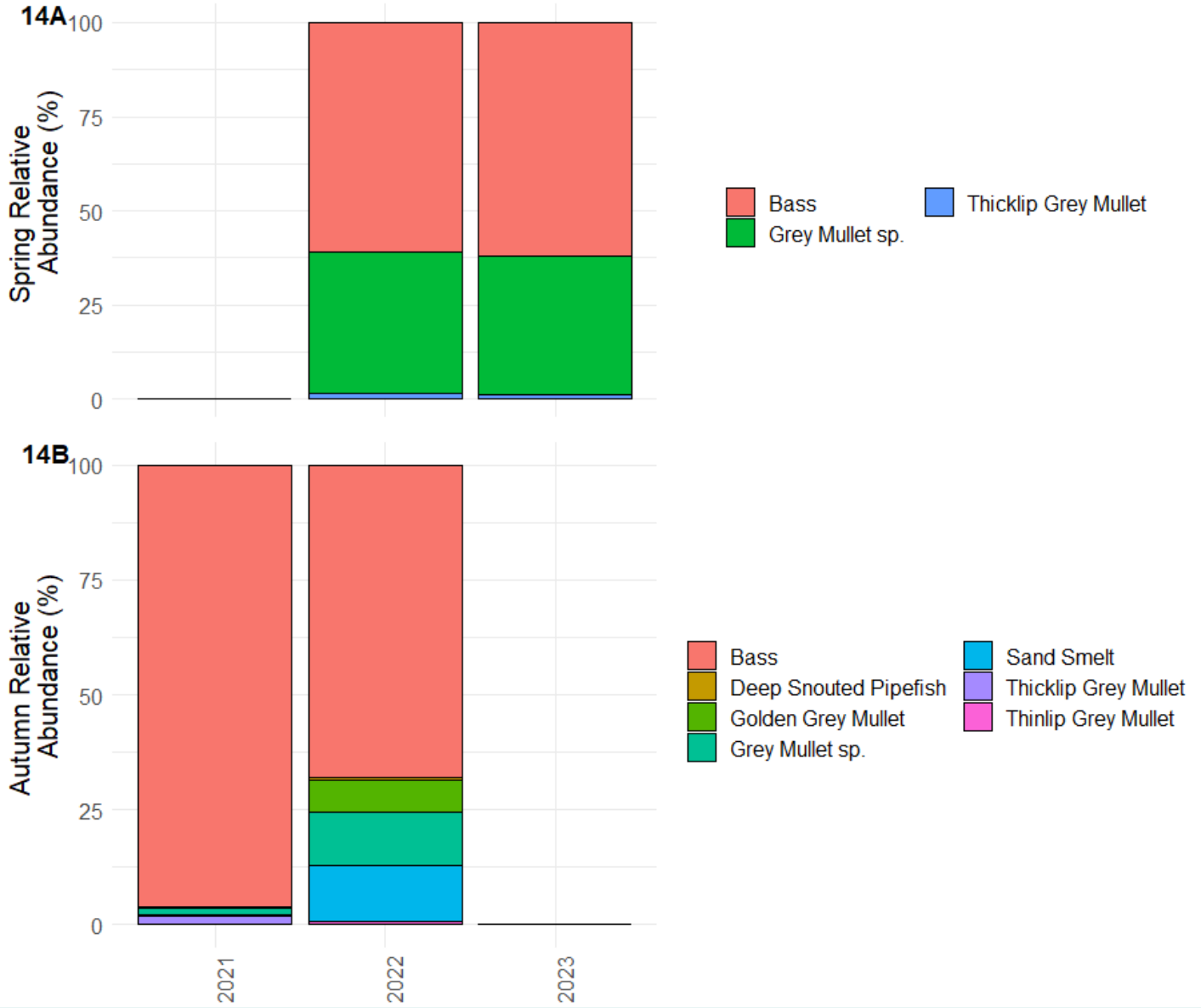
River Hamble



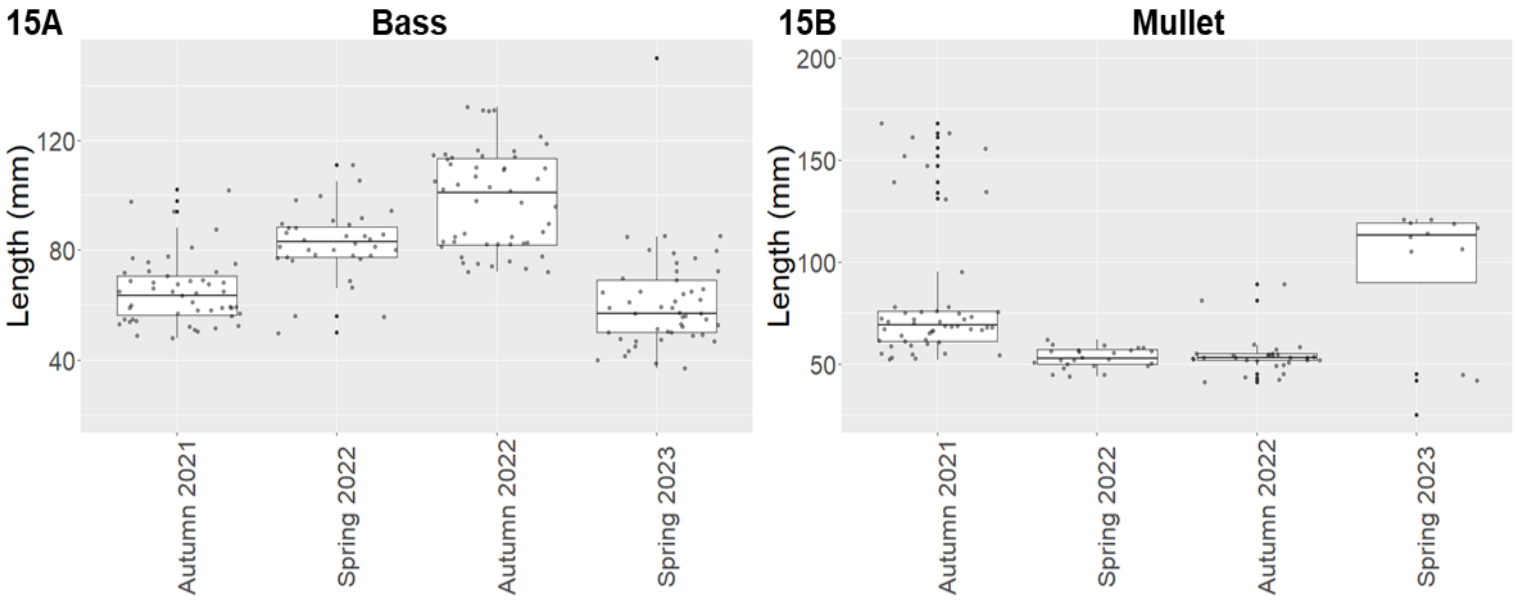
- Figures 13A,13B and 13C display the Species Richness, Shannon Diversity Index (H) and total abundance in each survey for the River Hamble site carried out between Spring 2017 and Spring 2023.
- Of the Autumn surveys mean species richness was highest in Autumn 2022 (6) and lowest in Autumn 2021 (5). Of the Spring surveys 2022 and 2023 had equal species richness (2.5).
- Of the Spring Surveys, 2022 had the highest mean H (0.64) and of the Autumn surveys, 2017 had the highest H (1.01).
- No statistical testing could occur due to a lack of repeat hauls in the Autumn surveys.
- Of the spring surveys, 2023 had the highest mean total abundance of fish (41) and 2022 the lowest (32). Of the autumn surveys, 2021 had the highest total abundance of fish (349) and 2022 the lowest (257). There is no significant difference within the Autumn surveys.
- There is no statistical difference between the species richness, Simpsons Diversity Index or total abundance between spring and autumn (table to the right).

	Spring	Autumn	P<0.05
Mean Species Richness	6.87	6.89	Yes
Mean Simpsons Diversity Index	1.28	1.11	No
Mean Total Abundance	162	147	No

River Hamble

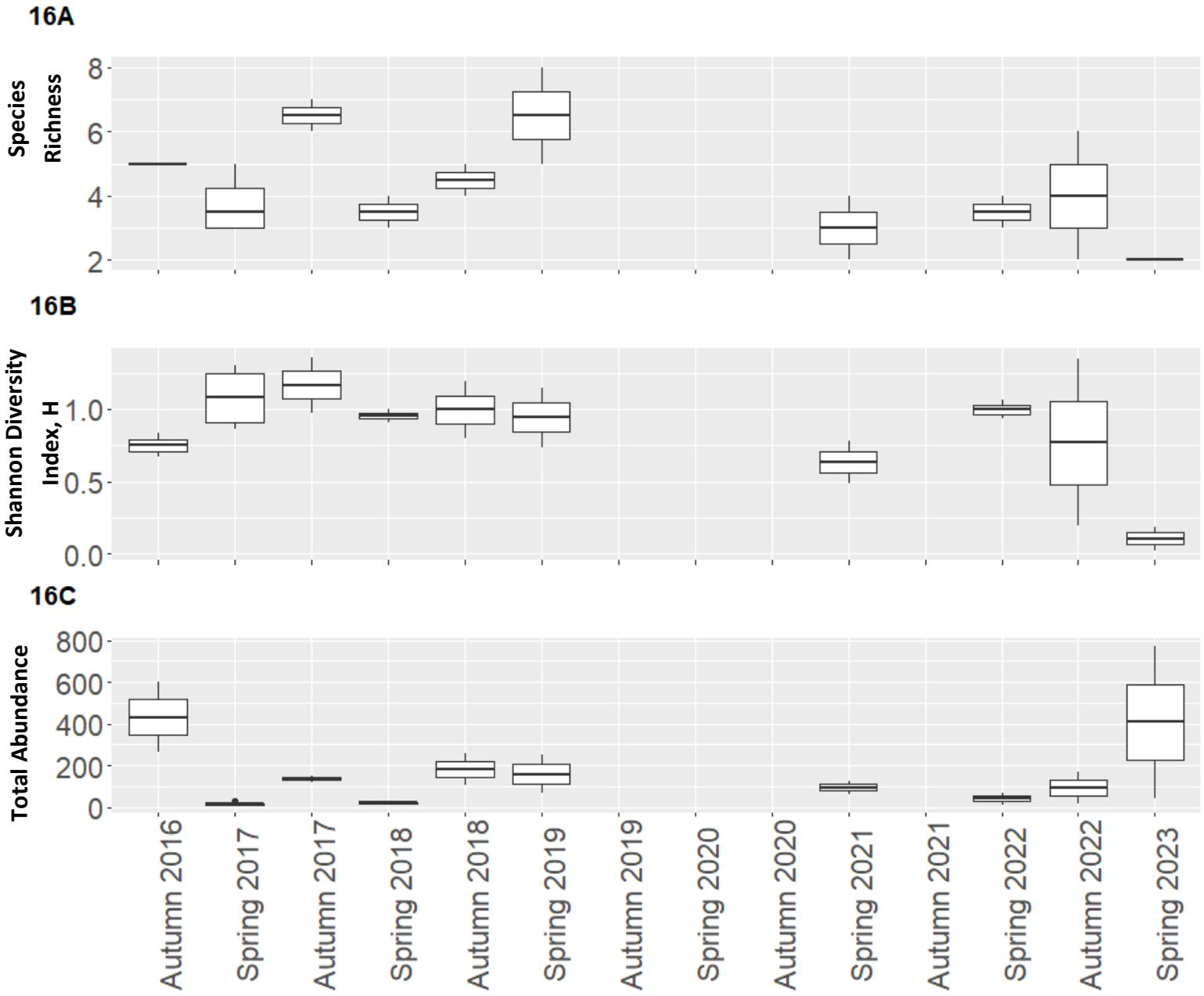


- Figures 11A (spring) and 11B (autumn) display the percentage relative abundance of each species during each survey.



- Figure 15A and 15B display the measured length of Bass and all Mullet species; only Bass and Mullet are displayed due to their commercial importance within the Southern IFCA district.
- All Grey Mullet sp. have been combined for Figure 15B due to difficulties in identifying the species as juveniles. Figure 15B shows distinct groups of sizes for Mullet sp., which could be related to the presence of the different species.

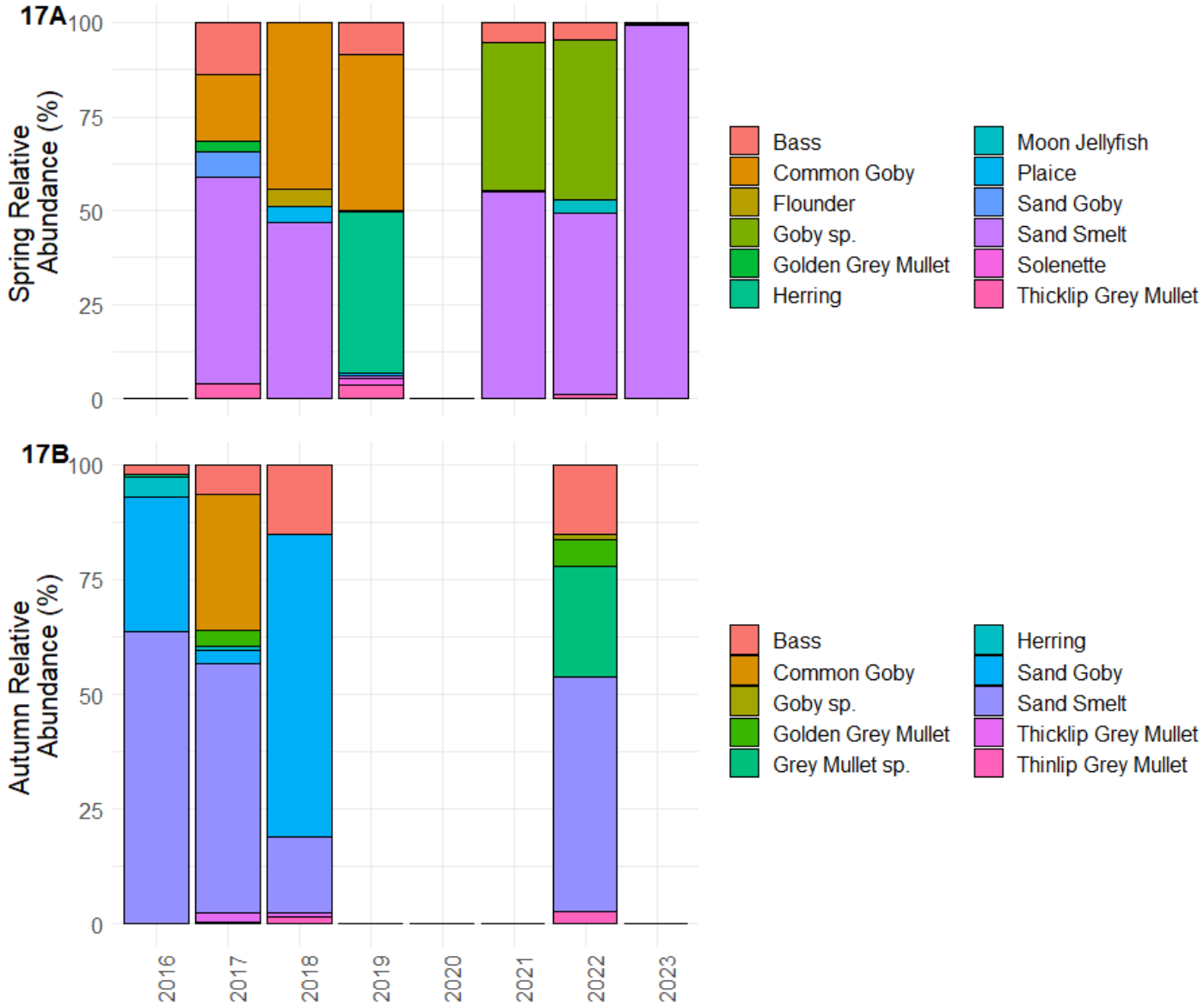
River Yar (Yarmouth Harbour)



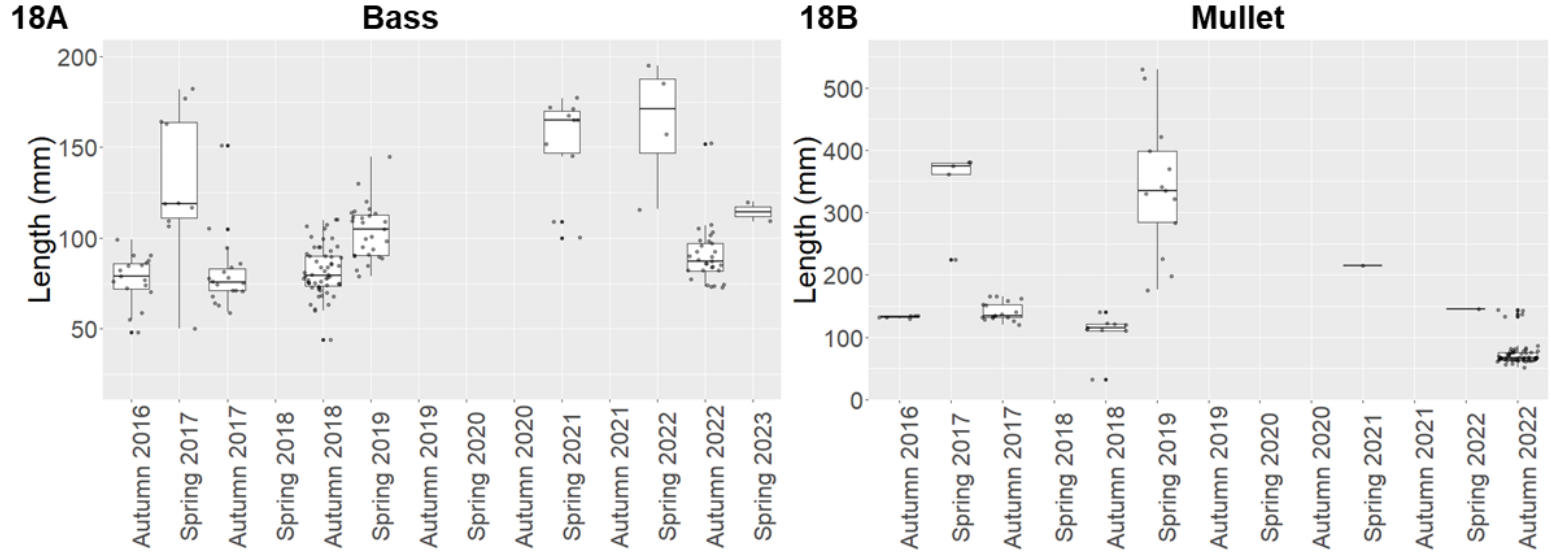
- Figures 16A,16B and 16C display the Species Richness, Shannon Diversity Index (H) and total abundance in each survey for the River Yar (Yarmouth Harbour) site carried out between Spring 2017 and Spring 2023.
- Of the Autumn surveys mean species richness was highest in Autumn 2017 (6.5) and lowest in Autumn 2022 (4). Of the Spring surveys mean species richness was highest in 2019 (6.5) and lowest in 2023 (2). There was no significant difference between any of the surveys species richness.
- Of the Spring Surveys, 2017 had the highest mean H (1.08) and of the Autumn surveys, 2017 had the highest H (1.17). There was no significant difference between H of any of the surveys.
- Of the spring surveys, 2023 had the highest mean total abundance of fish (408) and 2017 the lowest (18). Of the autumn surveys, 2016 had the highest total abundance of fish (432) and 2022 the lowest (95). There is no significant difference between the surveys.
- There is no statistical difference between the species richness, Simpsons Diversity Index or total abundance between spring and autumn (table to the right).

	Spring	Autumn	P<0.05
Mean Species Richness	3.71	5	No
Mean Simpsons Diversity Index	0.83	0.92	No
Mean Total Abundance	117	212	No

Yarmouth



- Figures 17A (spring) and 17B (autumn) display the percentage relative abundance of each species during each survey.



- Figure 18A and 18B display the measured length of Bass and all Mullet species; only Bass and Mullet are displayed due to their commercial importance within the Southern IFCA district.
- All Grey Mullet sp. have been combined for Figure 18B due to difficulties in identifying the species as juveniles. Figure 18B shows distinct groups of sizes for Mullet sp., which could be related to the presence of the different species.