

CHAPTER 9

Basin Plan Fish Monitoring Summary (2015/16 – 2024/25): New South Wales Lower Darling Water Resource Planning Area

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9.1 Citation Details

Please cite the overall report when referring to this chapter:

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9.2 Acknowledgements

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9.3 Introduction

This report spans 2015/16 to 2024/25 and uses all suitable fish assemblage data collected by NSW DPIRD Fisheries using standardized electrofishing monitoring techniques. The format of the report follows and expands upon the previous reports (Schilling & Crook 2023, 2024, 2025b). This report focusses on the New South Wales Lower Darling Water Resource Planning Area (WRPA) shown in Figure 9.1.

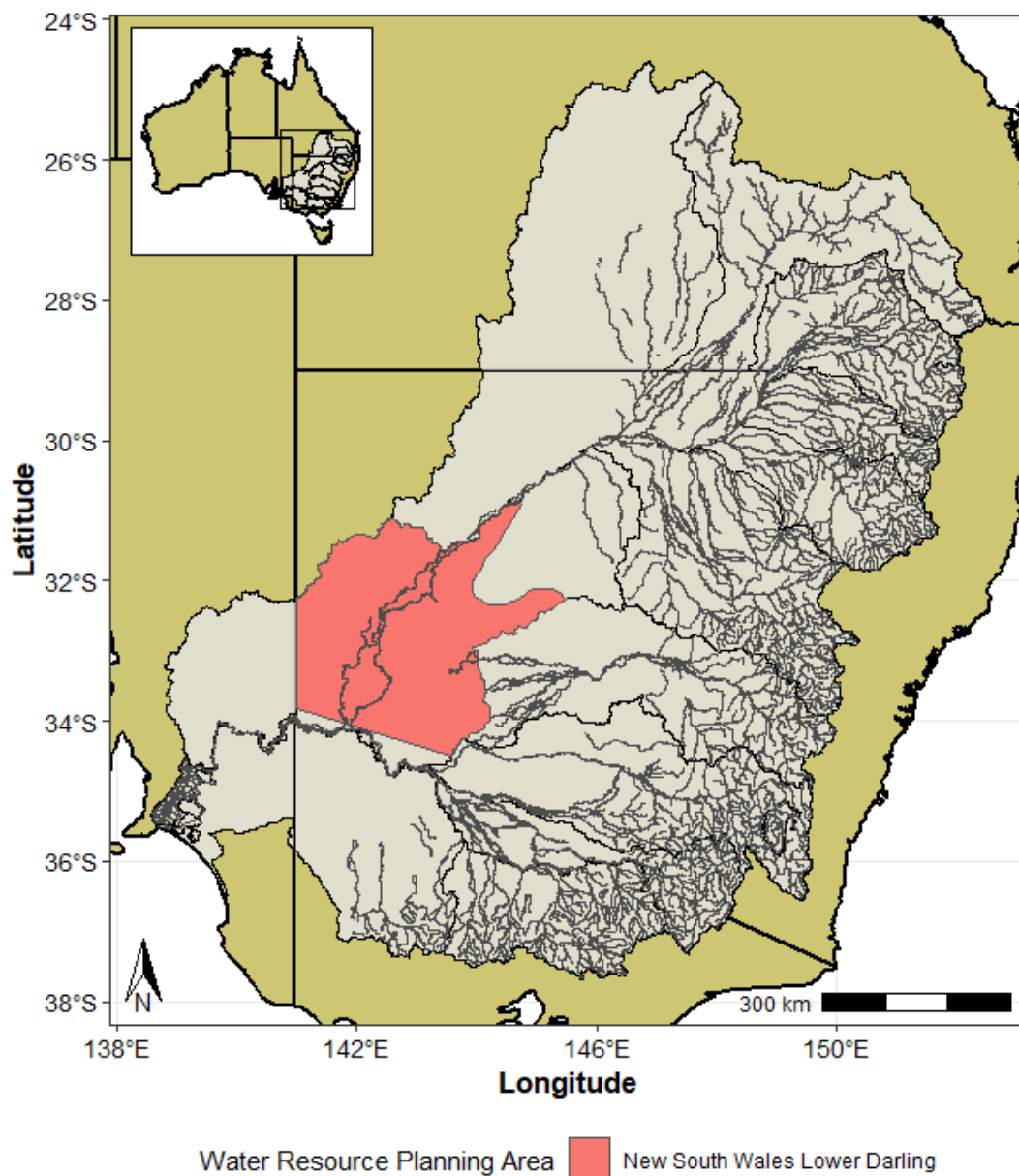


Figure 9.1: Murray-Darling Basin with the key region of this report highlighted. Inset map shows the whole of Australia with a box around the MDB.

9.3.1 What This Report Includes

This report starts with an overview of the standardised monitoring programs including sampling details and statistics. An overview of the hydrological and climatic conditions during the reporting period is also provided as context for interpreting the fish population status data.

Following the introductory sections, we present a summary of *fish diversity* across the New South Wales Lower Darling WRP. Separate plots for native and alien species show the total number of unique species observed at each site.

The main body of the report provides detailed information on the *population structure, relative abundance, health, and distribution* of six key fish species:

- Murray cod
- Golden perch
- Freshwater catfish
- Bony herring
- Australian smelt
- Common carp

Population structure information includes length frequency plots of observed fish and the proportion of fish classified as Young of the Year (YOY). This information can be used to infer the size structure of populations and the level of recruitment each year. For additional context, we provide a summary table showing any stocking which occurred for the species in each year (if relevant).

Relative abundance and *relative biomass* (a unit-less measure representing the number (or biomass) of fish in an area) information is adapted from the modelled outputs from a more in-depth publication (Crook et al. 2023) which considers all available electrofishing data within the NSW Murray-Darling Basin (MDB). The updated analysis uses generalised linear mixed models to generate annual indices of relative abundance and biomass for each WRP. In this report we present the modelled time series of relative abundance showing the predicted number (or biomass) of fish observed per 90 second shot of electrofishing. The abundance and biomass trends for the New South Wales Lower Darling WRP are contrasted with the overall NSW MDB dataset. It should be noted that these are modelled estimates of relative abundance/biomass, not absolute abundance/biomass as absolute estimates would require extensive calibration surveys that are not included in the monitoring program.

Health information is provided as a summary of any visible health conditions recorded for the key species. The number of health conditions observed in a fish population is generally reflective of water quality, competition, and many other factors. Fewer observations of health conditions indicate healthier populations. The health conditions detailed are any that were observed as part of the biological measurements taken. We provide a comparison of the prevalence of health conditions in the New South Wales Lower Darling WRP and greater MDB (excluding the New South Wales Lower Darling WRP).

Distribution maps are provided for each species to show the observed distribution of each species from electrofishing samples. The distribution maps also show the relative abundance (number of fish observed per 90 seconds of electrofishing) at each site to give an indication of how the population is spread over the landscape.

Finally, the distributions and numbers of *Threatened species* are reported. The report includes threatened species that were recorded by standardised monitoring programs in the New South Wales Lower Darling WRP during the reporting period.

For each section of the report, we provide a *Summary Statement*. This statement provides a very brief overview of the key messages for each section.

9.3.2 Sampling Methods

Three main methods are used during routine fish monitoring surveys: boat electrofishing, backpack electrofishing and bait traps. This report mainly includes the electrofishing data with the bait traps informing the distribution of small bodied threatened species. The electrofishing was conducted using the standard methodology implemented in the Sustainable Rivers Audit (SRA; Davies et al. 2010). This usually includes 12 shots of 90 seconds “power on” during each sampling event.

As each chapter of this report compiles data from multiple projects, there is some variation in how sites were chosen and the effort of sampling conducted each year (Table 9.1). Details of which projects contributed data to this report can be seen in Table 9.7. At each site, sampling gear was applied as suited to the local conditions with either boat, backpack, or a hybrid of the two, in addition to 10 unbaited bait traps that are set in areas of the sampling reach that are not electrofished. Most sampling occurred between the months of September and May.

Table 9.1: Sampling effort (Number of sites sampled) each sampling season in the New South Wales Lower DarlingWRPA. Variation in sampling effort is due to different numbers of projects and interruptions to planned sampling such as flooding, site desiccation, and extreme weather.

Sampling Season	Number of Boat Electrofishing Sites	Number of Backpack Electrofishing Sites	Total
2015/2016	5	0	5
2016/2017	10	2	12
2017/2018	8	0	8
2018/2019	20	0	20
2019/2020	22	0	22
2020/2021	23	0	23
2021/2022	10	0	10
2022/2023	23	0	23
2023/2024	38	0	38
2024/2025	36	0	36

The sites sampled during the reporting period are shown in Figure 9.2. A breakdown of sites sampled each sampling season is shown in the Appendix (Figure 9.32).

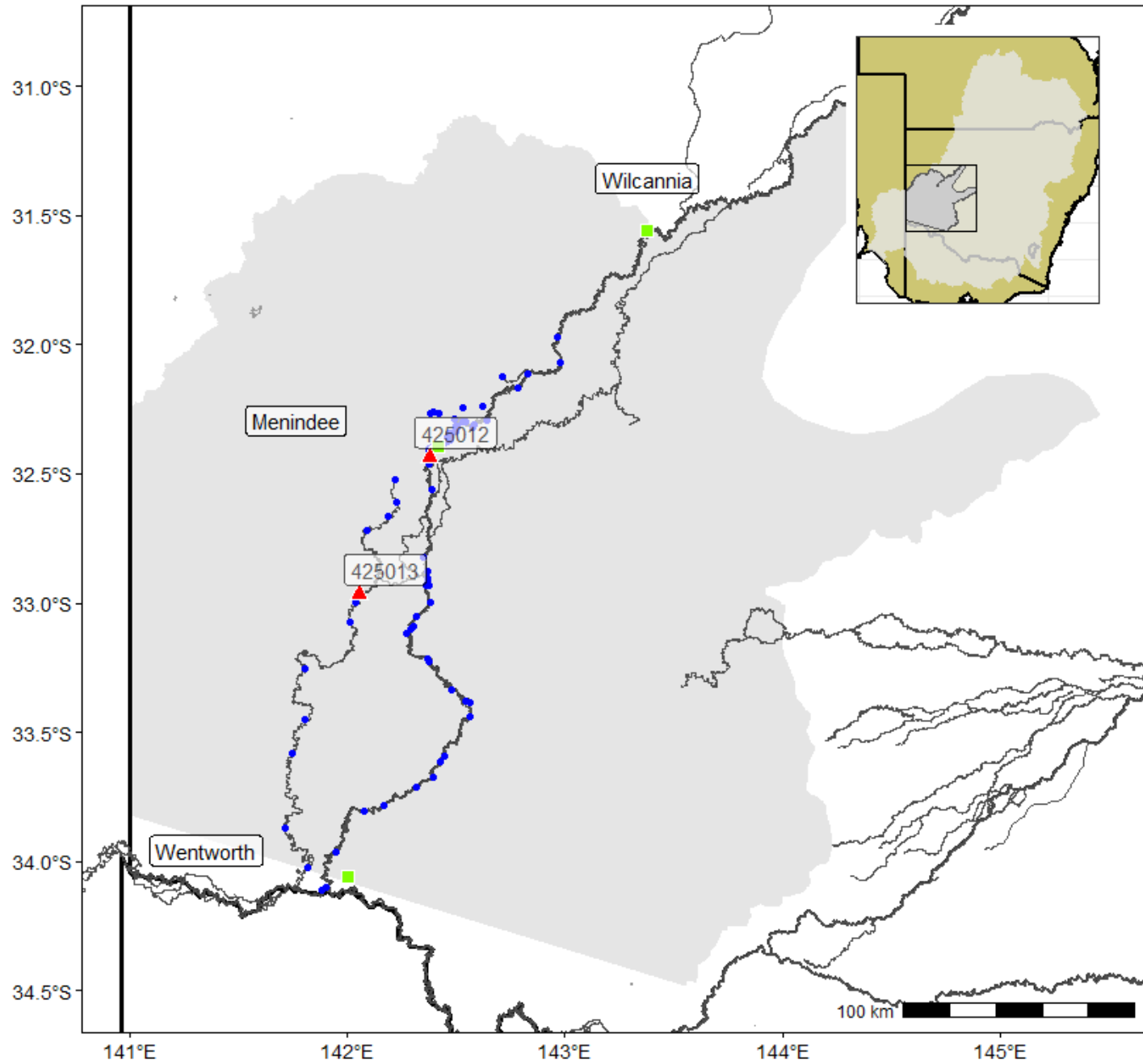


Figure 9.2: Sites (dots) sampled during the reporting period. Red triangles show key flow gauges along with their gauge ID number. Green squares show key towns

Each sampling method has a different effectiveness at sampling each species. Table 9.2 shows the total numbers of each key species caught by each method.

Table 9.2: Number of each key species caught by sample method over the 10 year period. Further data on total catch is provided in the Appendix.

Common name	Bait Trap	Boat Electrofishing	Backpack Electrofishing
Australian smelt	2	815	0
Bony herring	11	13,736	4
Common carp	466	20,498	10
Golden perch	5	1,518	0
Murray cod	0	365	0

A subset of sampled fish had biological measurements taken during the surveys, including but not limited to length and weight measurements and visual health assessments. Table 9.3 shows the number of biological measurements taken each year for the key species.

Table 9.3: Number of biological measurements taken for the key species each sampling season.

Sampling Season	Australian smelt	Bony herring	Common carp	Golden perch	Murray cod
2015/2016	8	153	60	14	12
2016/2017	50	524	253	44	5
2017/2018	6	400	148	25	9
2018/2019	172	812	733	240	97
2019/2020	57	394	238	80	20
2020/2021	166	1,178	246	269	122
2021/2022	39	245	203	122	17
2022/2023	77	908	2,303	257	17
2023/2024	141	1,776	1,293	290	44
2024/2025	85	1,324	794	218	25

9.4 Climate Overview

The following is a summary of the climatic conditions during the reporting period in terms of how the observed conditions compare to long term records. These are direct extracts from the [Australian Bureau of Meteorology climate summaries archive](#) and are written in the given year. To interpret, 2019 states it was the warmest year on record, meaning 2019 was the warmest year on record up to and including 2019 but not including more recent years.

9.4.0.1 2015

New South Wales recorded well above average temperatures in 2015. Nights were particularly warm, the sixth-warmest on record for the State. Rainfall was close to average for the state as a whole.

9.4.0.2 2016

2016 was a generally wet, warm year for NSW as a whole, with substantial variability throughout the year and across the state. Following a record-warm start to the year, May to September was the wettest such period on record for NSW, with cooler weather in much of the west of the state. Minimum temperatures were the warmest on record for the State as a whole, with record-warm daytime temperatures on parts of the east coast.

9.4.0.3 2017

The year 2017 was the warmest on record for New South Wales for both mean and daytime temperatures. It was also the State's driest year since 2006. Following the warmest summer on record for the State, heavy rain in March across the east then made way for a very dry winter and start to spring. Winter overnight temperatures were the lowest since 1997, but daytime temperatures remained above average for most of the year, and were the warmest on record overall.

9.4.0.4 2018

2018 was the warmest on record for New South Wales for both mean temperature and mean maximum temperature, whilst the mean minimum temperature was fourth-warmest on record. The year was dominated by very dry conditions, with the third-driest January to September on record. October to December saw some relief from the dry, with above average rainfall across parts of the State. Despite this, New South Wales experienced its sixth-lowest annual rainfall on record; its driest year since 2002.

9.4.0.5 2019

2019 was the driest and warmest year on record for New South Wales. Despite some rain in some months, most of the State received much less rainfall than usual, with the northeast and far west particularly dry. Heatwaves in January brought very high temperatures, and large fires from September onward caused extensive damage and persistent smoke.

9.4.0.6 2020

2020 saw above average temperature and rainfall in New South Wales. Temperatures were above average across the state in most months except during autumn. There was widespread rain during autumn and spring and in December, but early winter and November rain was below average.

9.4.0.7 2021

New South Wales had its 6th wettest year on record, with 2021 rainfall 30% above average. This included significant floods along the east coast in March, and the state's wettest November on record. It was the state's coolest year since 1996, at 0.15 °C above the 1961–1990 average.

9.4.0.8 2022

2022 was exceptionally wet with the state-averaged annual total being the second-highest on record (since 1900) and many sites recording their highest annual totals on record. Maximum temperatures were lower than average with the state-averaged annual maximum temperature being the coolest since 1992. Minimum temperatures were generally warmer than average with the state-averaged annual minimum temperature being 0.73 °C above the 1961–1990 average.

9.4.0.9 2023

The state-averaged rainfall was 22.9% below the 1961-1990 average. Rainfall was above average over small parts of the state's south, west of the Great Dividing Range, while being below average over most of the northern half of the state, especially over parts of the Northern Tablelands, Northern Rivers, Mid-North Coast, and Upper Hunter, where annual rainfall was in the lowest 10% of historical records (since records began in 1900). State-averaged annual maximum temperature was 1.96 °C above the 1961-1990 average, which is the third highest on record.

9.4.0.10 2024

Rainfall totals in 2024 were above average to very much above average for the northern and western areas of the state, as well as central parts of the coast. Totals were below average for large parts of the south-east, as well as small parts of the state's north-east and south-west. Mean maximum temperatures in 2024 were above average to very much above across the state, and highest on record around southern parts of the South West Slopes and Snowy Mountains districts.

9.4.0.11 2025

The 2025 NSW climate summary is not yet available but in early 2026 it will be available [here](#).

9.5 Flow Data

Below shows a summary of flow data from a variety of flow gauges in the New South Wales Lower Darling WRP (Figure 9.3).

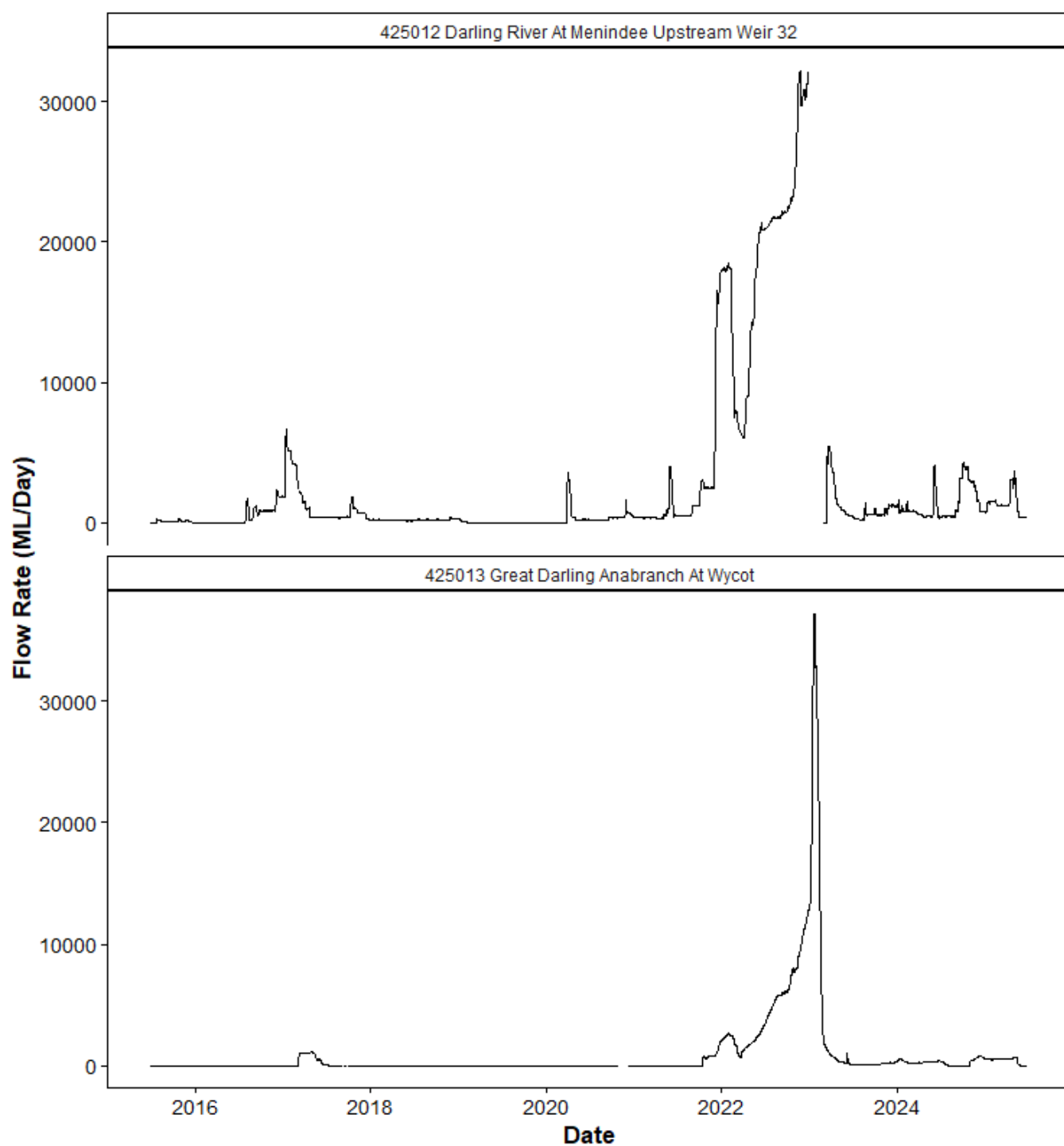


Figure 9.3: Flow data from various gauges in the New South Wales Lower Darling WRP over the reporting period. Gauge locations can be seen on Figure 9.2. Note the differing scales on the y-axis.

Water temperature data, where available, are also shown in Figure 9.4.

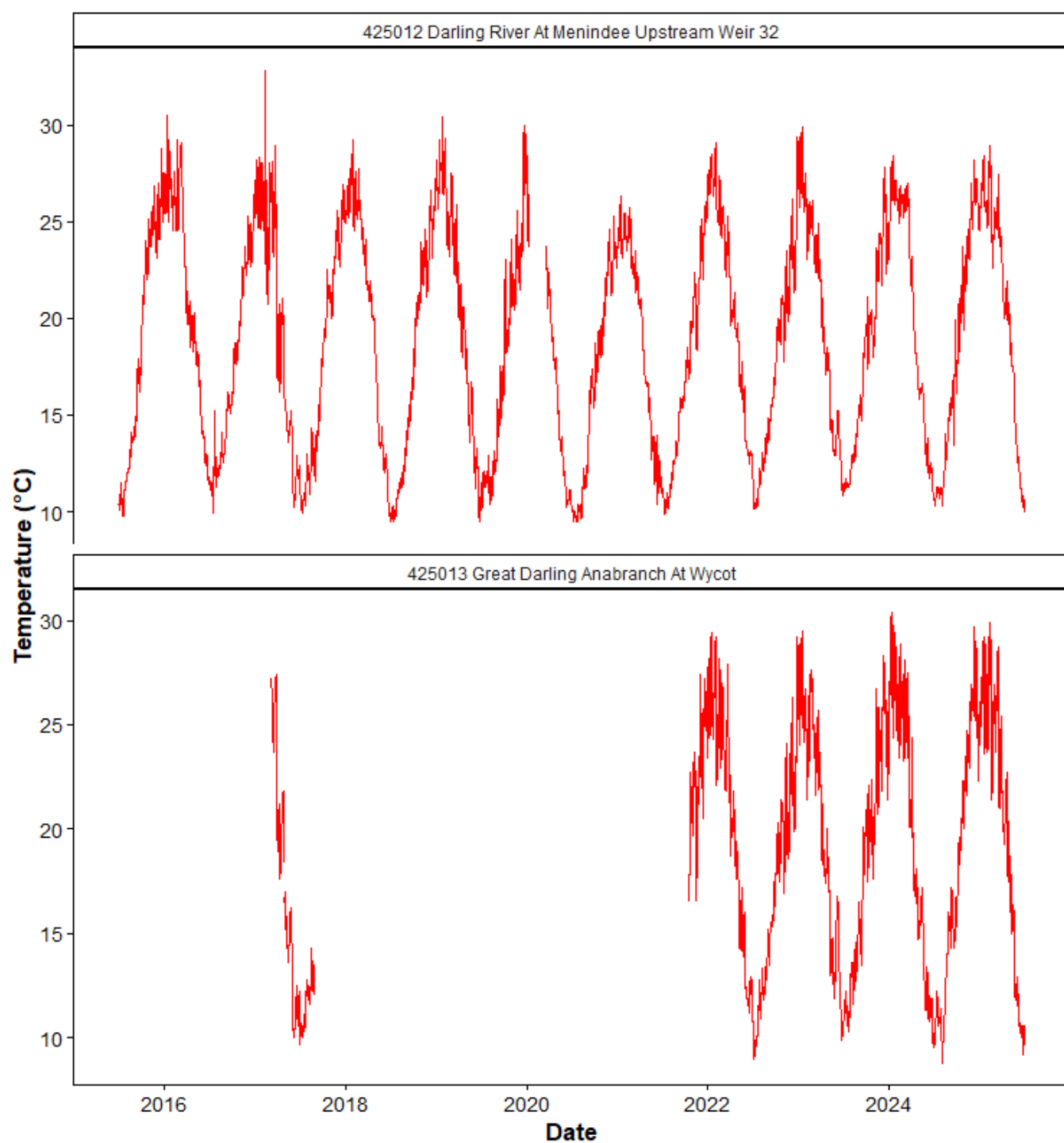


Figure 9.4: Water temperature data from various gauges in the New South Wales Lower DarlingWRPA over the reporting period. Gauge locations can be seen on Figure 9.2. Note the differing scales on the y-axis.

9.6 Species Diversity

A total of 15 fish species were observed across the New South Wales Lower Darling WRPAs including five alien species. Figure 9.5 shows the number of native and alien species found at each site. The full list of species caught and observed is presented in Table 9.8.

9.6.0.1 Summary Statement:

Native diversity was highest in the central and southern (main channel) area of the New South Wales Lower Darling region while the alien diversity was generally consistent across the region.

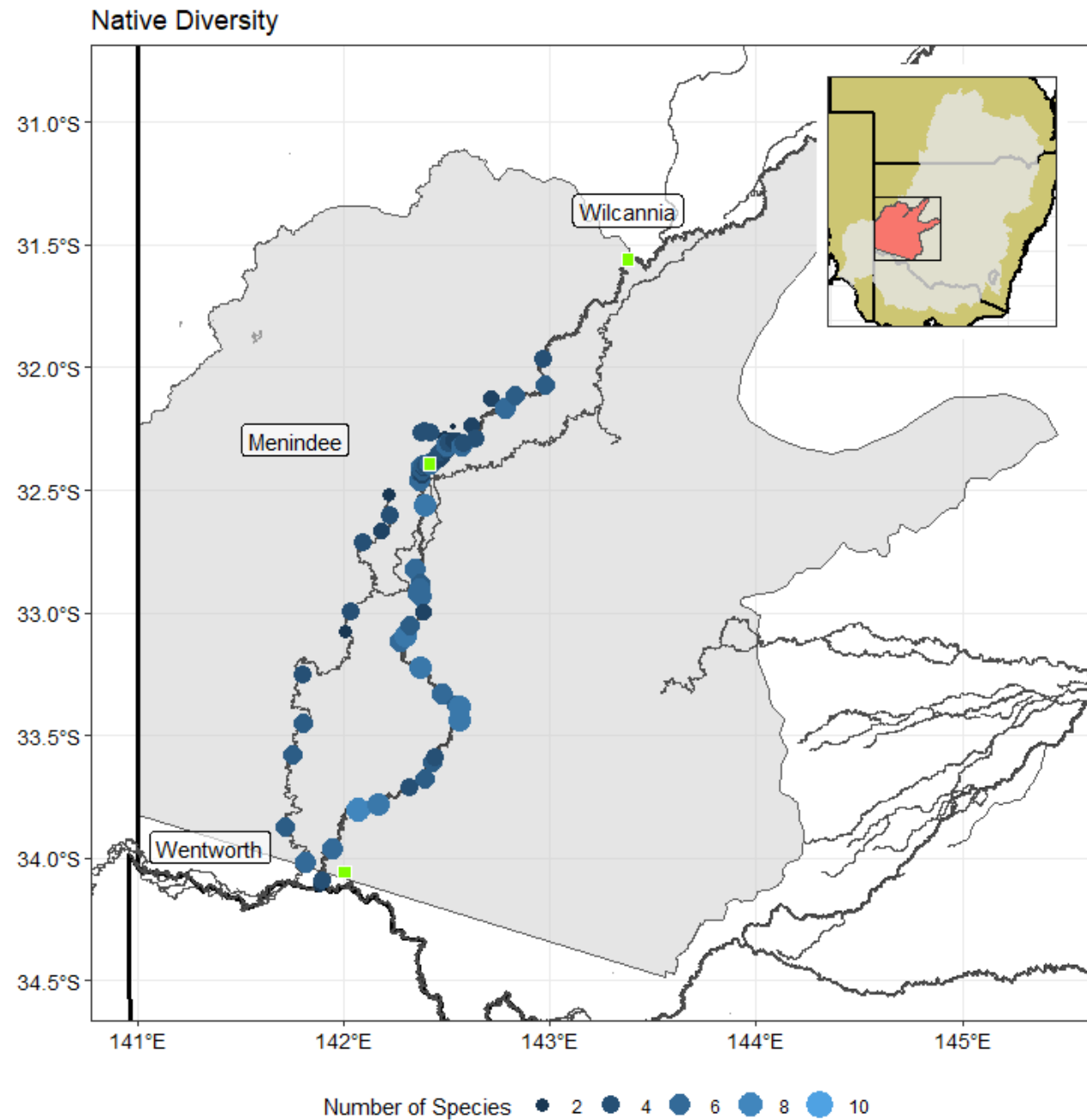


Figure 9.5: Native diversity across all sampling sites. Bubble size represents the number of unique species observed at each site across all sampling methods and events. X represents a site that had water and was sampled, but no fish species were caught at all. Green squares show key towns. Dry sites are excluded.

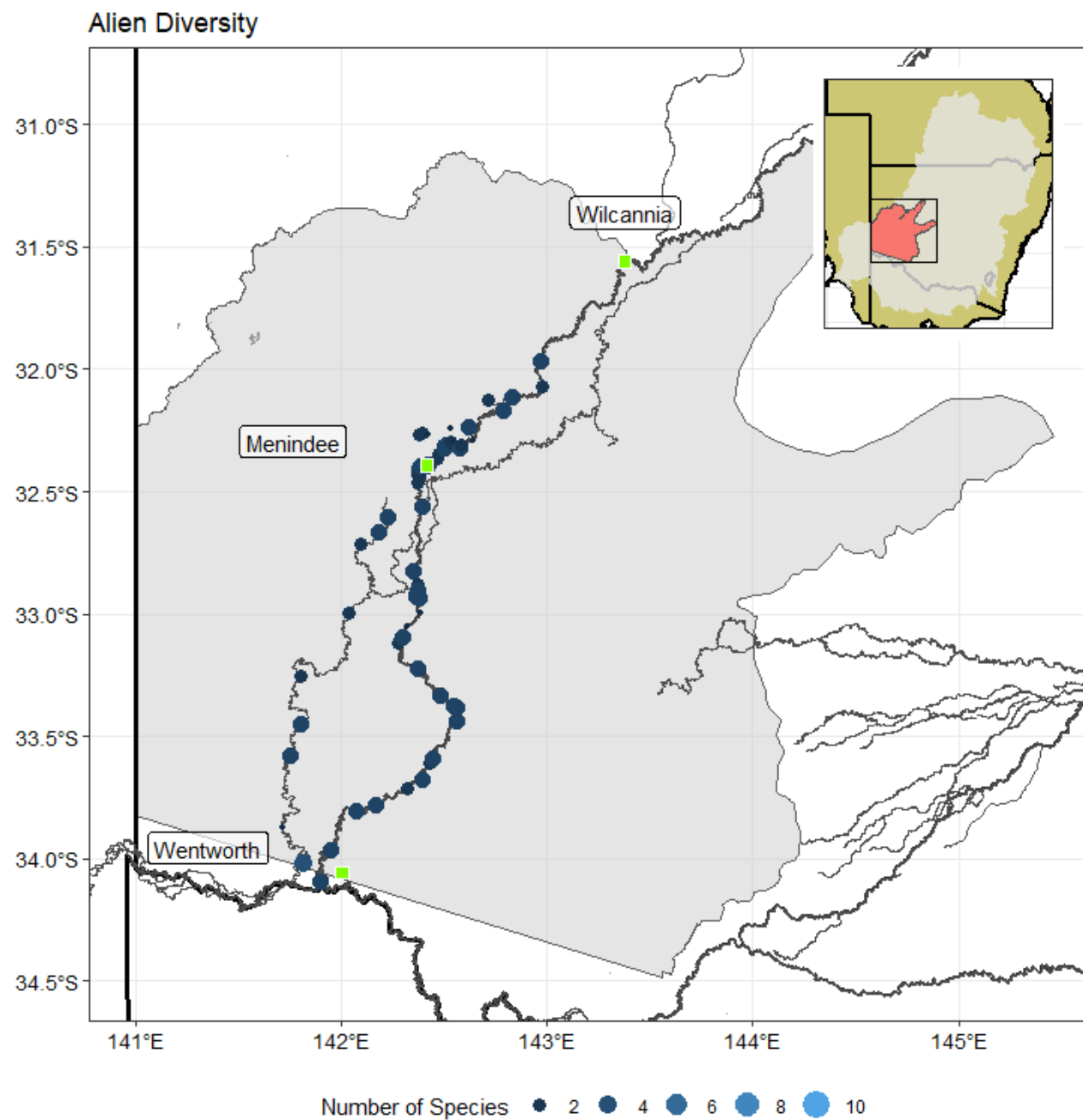


Figure 9.6: Alien diversity across all sampling sites. Bubble size represents the number of unique species observed at each site across all sampling methods and events. X represents a site that had water and was sampled, but no fish species were caught at all. Green squares show key towns. Dry sites are excluded.

9.7 Murray cod



9.7.1 Population Structure

Figure 9.7 shows the observed length frequency plot for Murray cod for each of the sampling seasons. The observed numbers of Young of the Year (YOY) ranged from 0 to 42, and 0% to 34% of measured fish within a season, with a mean percentage YOY of 14%.

Overall, during the reporting period, across all the MDB water resource planning areas, the percentage YOY for Murray cod was 11% (1,209 out of 11,063).

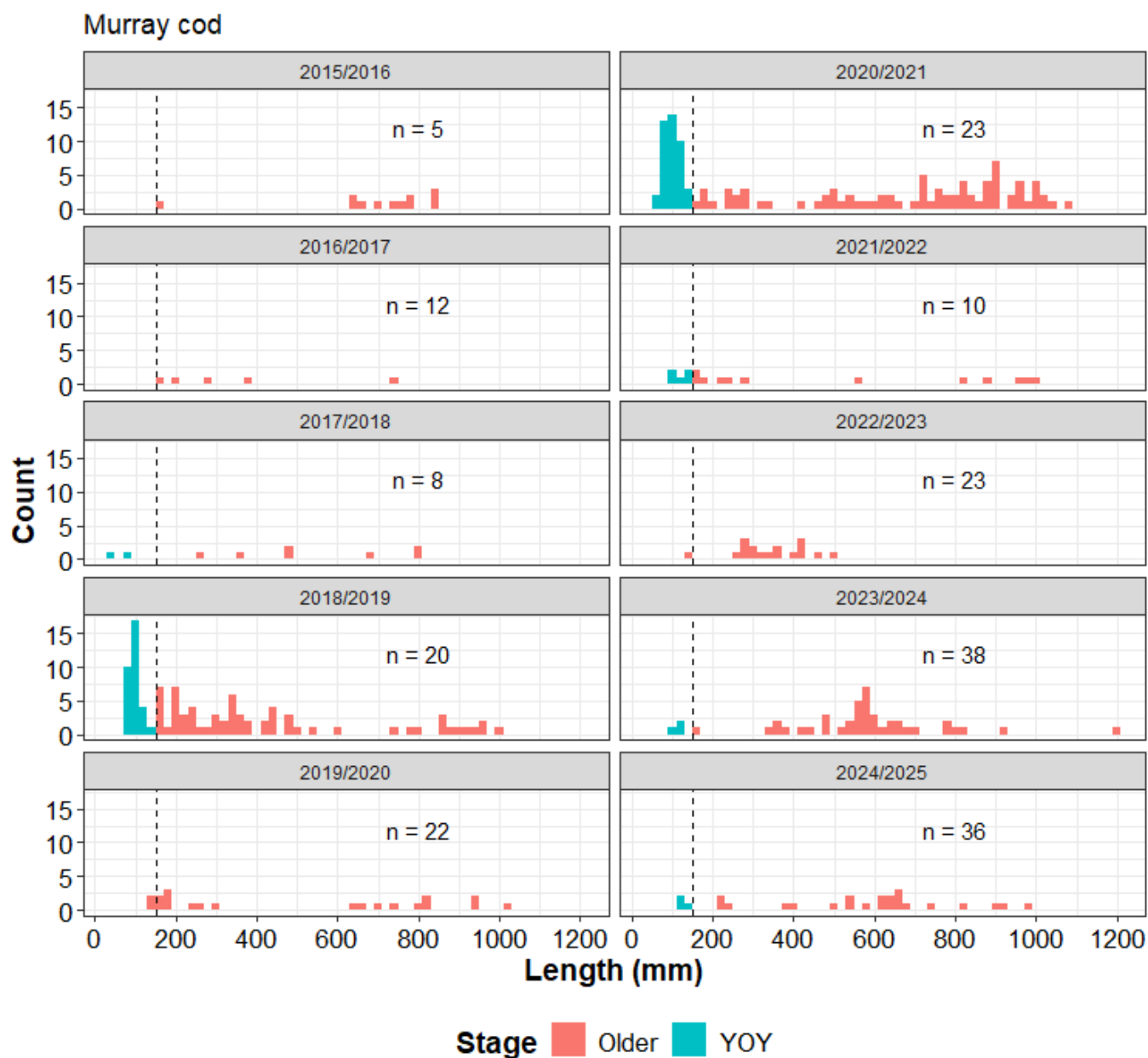


Figure 9.7: Length frequency plots for Murray cod by sampling season. YOY represents Young of the Year fish. n shows the number of sampling events in each season. Note some stages may appear either side of the cut-off line due to binning of data in the histogram.

9.7.1.1 Summary Statement:

Irregular recruitment with only 3 YOY observed in 2024/25 despite a range of larger sized Murray cod observed.

9.7.1.2 Stocking

A total of 238,040 Murray cod were stocked into the waterways of the New South Wales Lower Darling WRPAs during the reporting period. Of these fish, 0 (0%) were stocked into impoundments while 238,040 (100%) were stocked into rivers or creeks. Table 9.4 shows the detailed breakdown of stocking by season, location and life stage while Figure 9.8 shows the locations of stocking.

Table 9.4: Number and life stage of stocked Murray cod each sampling season.

Sampling Season	River/Creek or Impoundment	Life Stage	Number Stocked
2020/2021	River/Creek	Fry	120,000
2021/2022	River/Creek	Fry	118,000
2024/2025	River/Creek	Fingerling	40

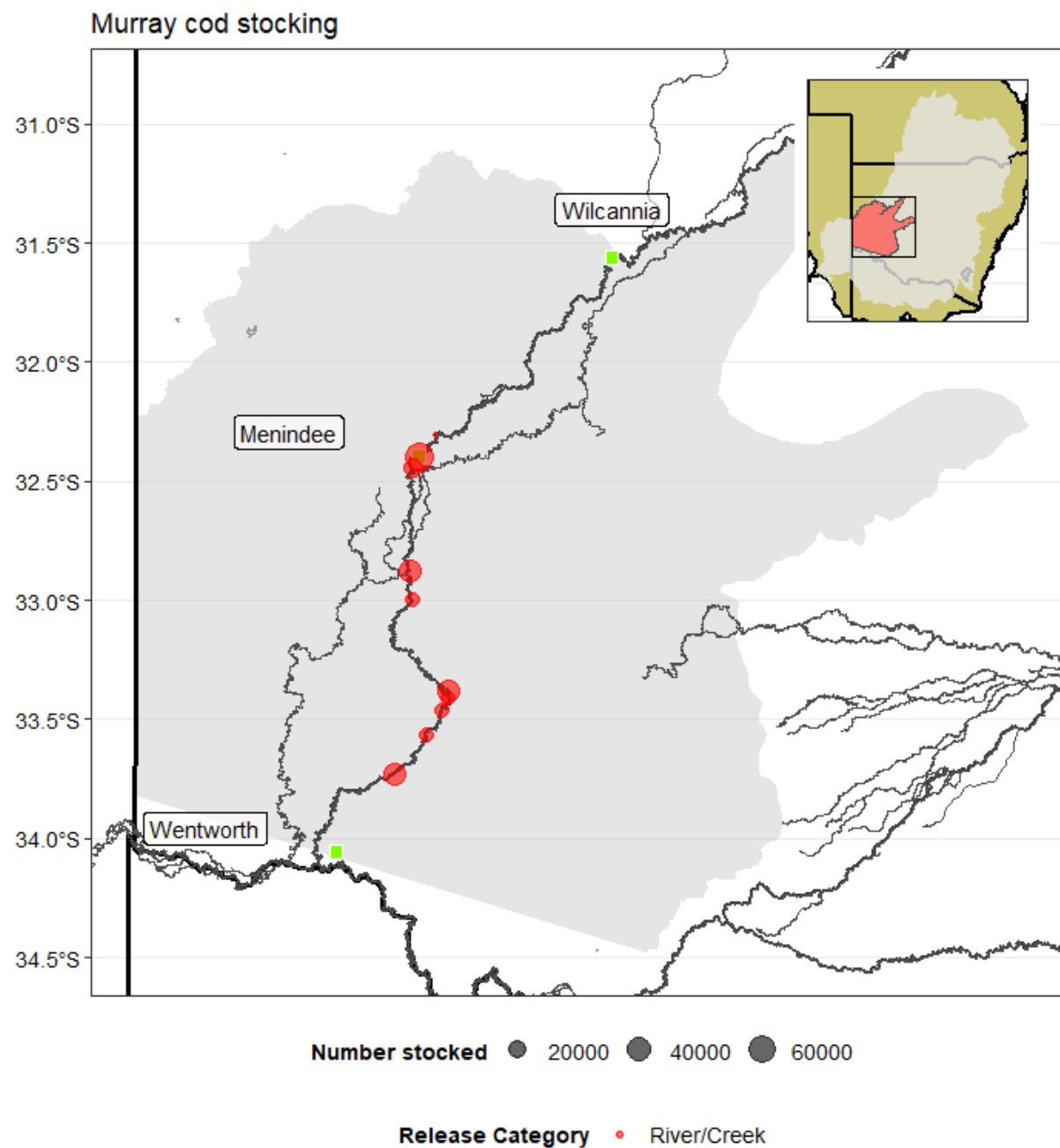


Figure 9.8: Locations of Murray cod stocking. Colours show whether a site was a river/creek site or an impoundment, while the size of the point reflects the total number of fish stocked over the reporting period. Green squares show key towns.

9.7.2 Temporal Trends in Abundance

The relative abundance and biomass of Murray cod since 1994 was modelled based on all suitable boat electrofishing data. The left-hand panels of Figure 9.9 show the abundance and biomass trends for the New South Wales Lower Darling WRP and the right-hand panels show the overall trends across the NSW MDB.

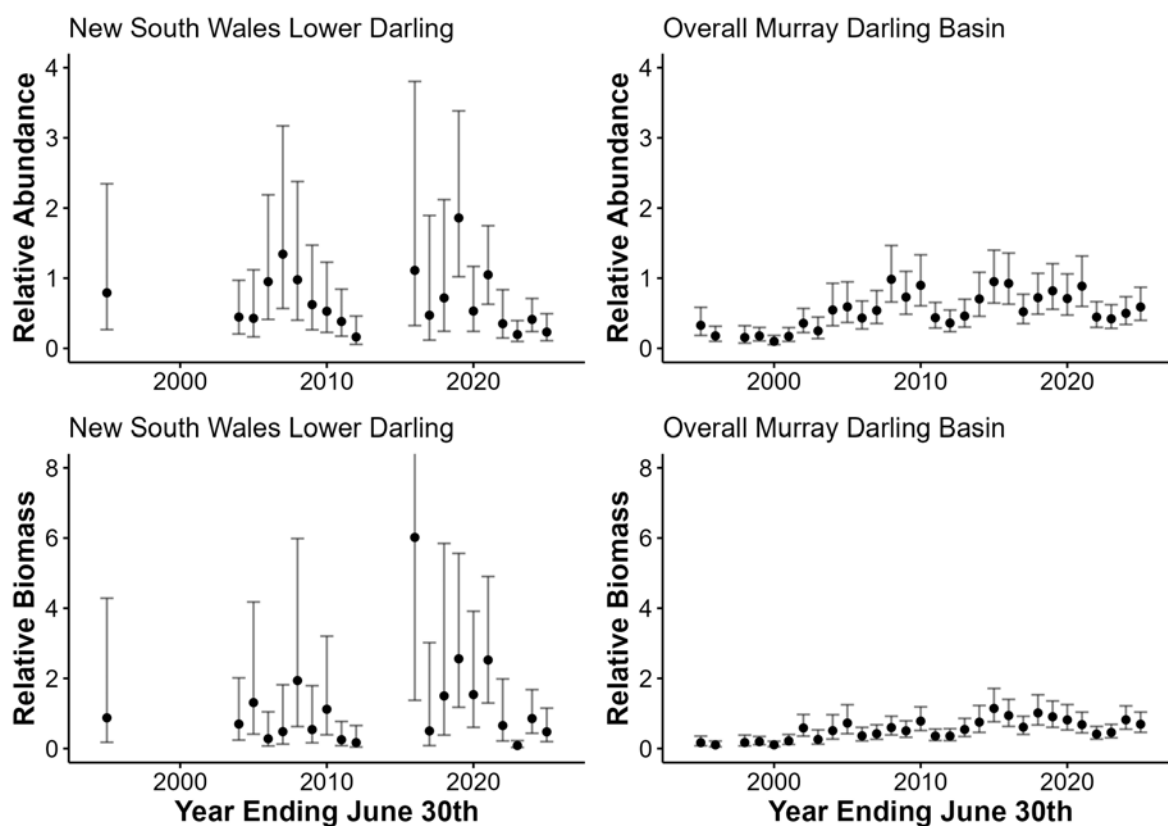


Figure 9.9: Relative abundance and biomass of Murray cod in this WRP and the overall NSW MDB. These are model estimates based upon all boat electrofishing data within the NSW DPIRD Freshwater ecosystem database and the output of generalised linear mixed models. Error bars show the 95% confidence intervals around the estimates. Some error bars may be truncated for clarity.

9.7.2.1 Summary Statement:

Abundance and biomass variable since the 1990s. A decreasing trend in abundance and biomass since 2021/22. Recent abundance and biomass likely lower than the wider NSW MDB.

9.7.3 Health

The prevalence of any health issues ranged from 0% of sampled fish in 2015/2016 to 60% of sampled fish in 2016/2017 (Figure 9.10). The most common health issue for Murray cod in the New South Wales Lower Darling WRPAs was the presence of the parasite *Lernaea*, which was observed in a total of 74 fish, corresponding to 20% of all Murray cod measured.

Across the other NSW MDB WRPA, 14% of Murray cod (1,592 out of 11,063 Murray cod) showed a health condition (excludes the New South Wales Lower Darling WRPAs).

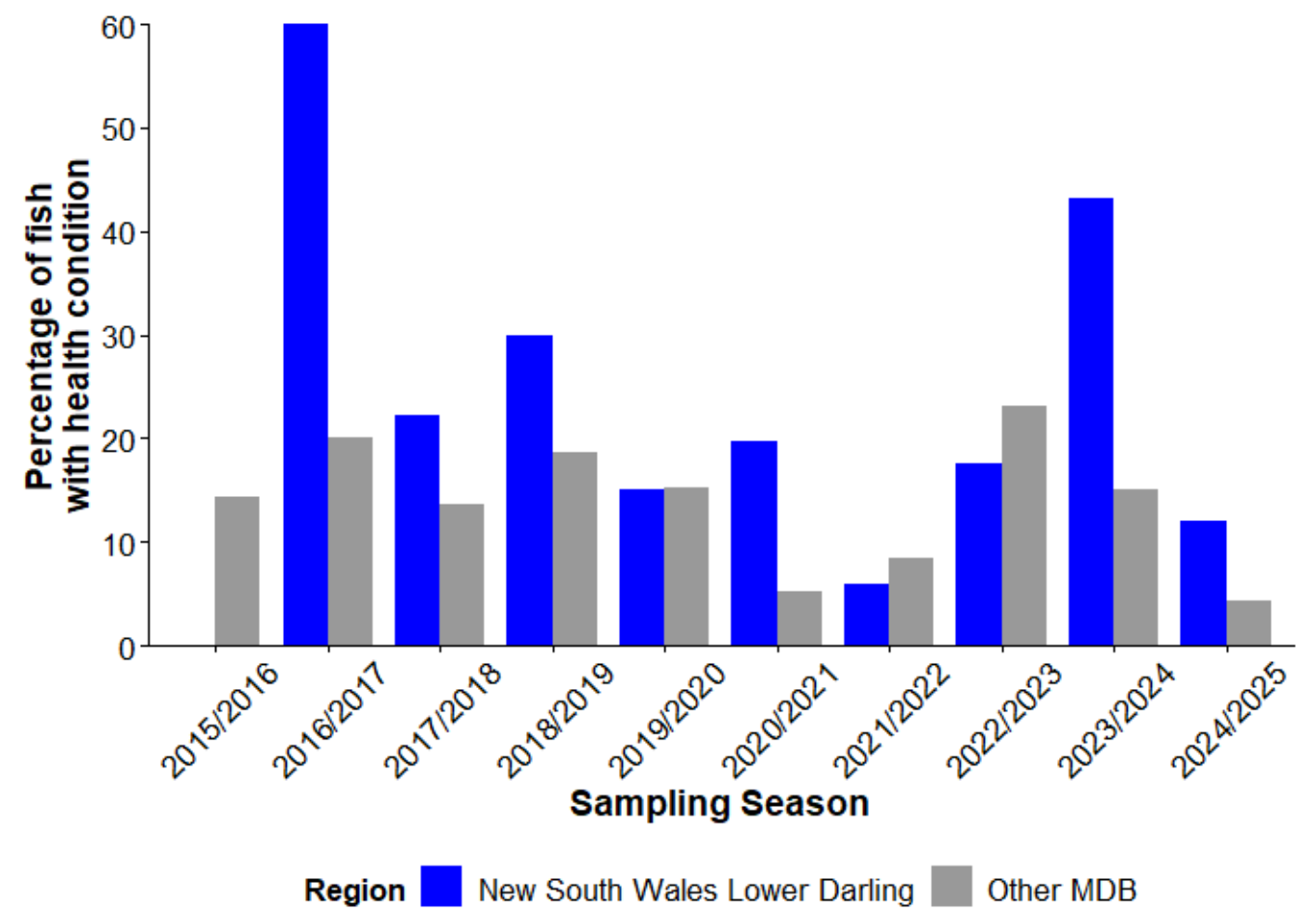


Figure 9.10: Timeseries showing the prevalence of health conditions in Murray cod. Blue shows the region-specific data while the grey shows the average across the other NSW MDB WRPA.

9.7.3.1 Summary Statement:

Presence of observable health conditions was variable across years but higher than the rest of the NSW MDB in 2023/24 and 2024/25.

9.7.4 Distribution

Murray cod were recorded at 33 out of 87 sites in the New South Wales Lower Darling WRP. The maximum observed relative abundance at a site was 0.8 fish caught per 90 seconds of electrofishing. Figure 9.11 shows the distribution and relative abundance of Murray cod across the New South Wales Lower Darling WRP.

9.7.4.1 Summary Statement:

Murray cod were recorded across the New South Wales Lower Darling WRP but less abundant or absent north of Menindee Main Weir and in the Great Darling Anabranch.

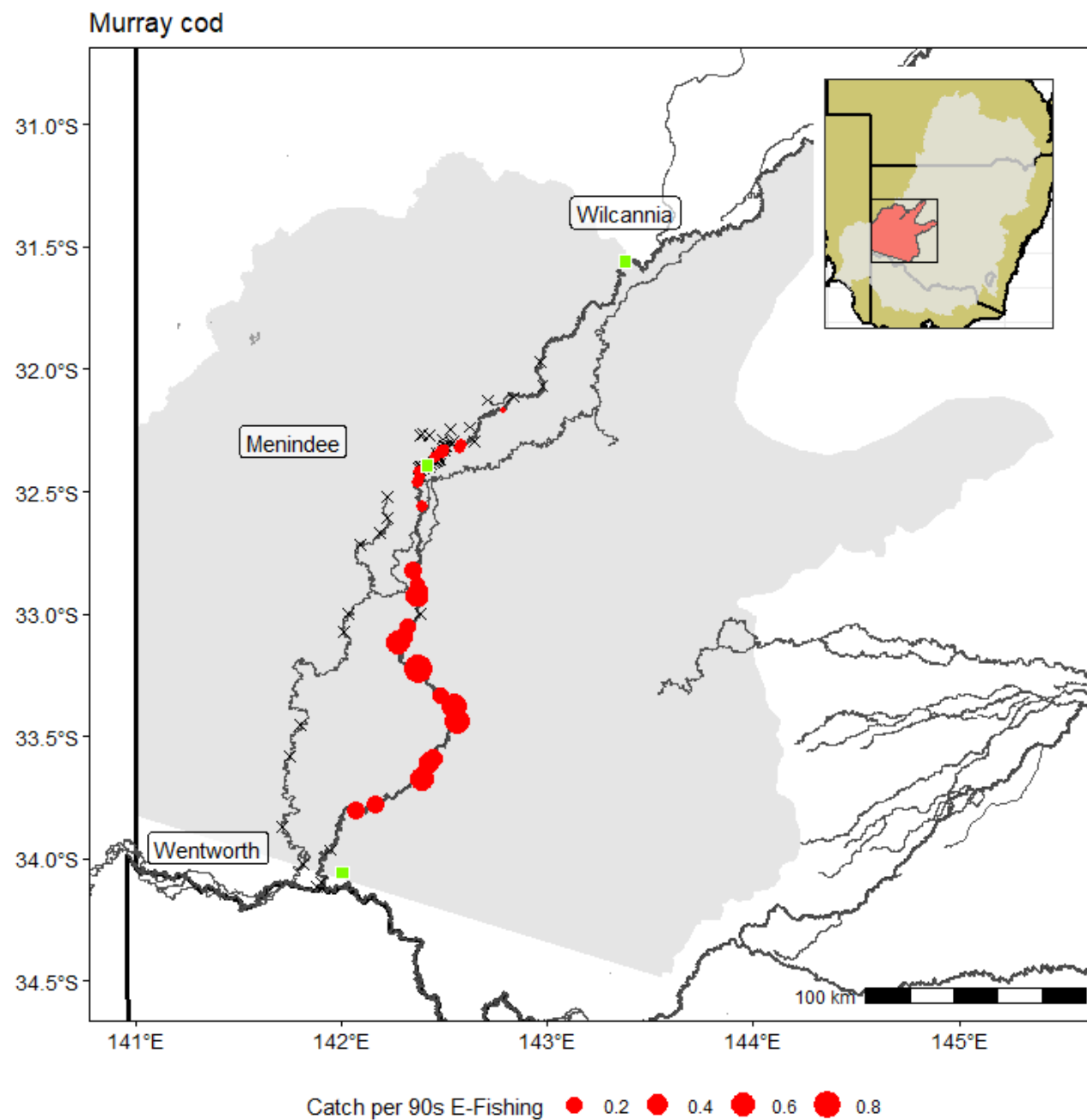


Figure 9.11: Distribution of Murray cod. Filled circles show sites where the species was present, and the size of the circle represents relative abundance. Sites that were sampled with electrofishing but did not contain the species are shown with an X. Green squares show key towns.

9.8 Golden perch



9.8.1 Population Structure

Figure 9.12 shows the observed length frequency plot for Golden perch for each of the sampling seasons. The observed numbers of Young of the Year (YOY) ranged from 0 to 118, and 0% to 55% of measured fish within a season, with a mean percentage YOY of 16%.

Overall, during the reporting period, across all the MDB water resource planning areas, the percentage YOY for Golden perch was 7% (522 out of 7,340).

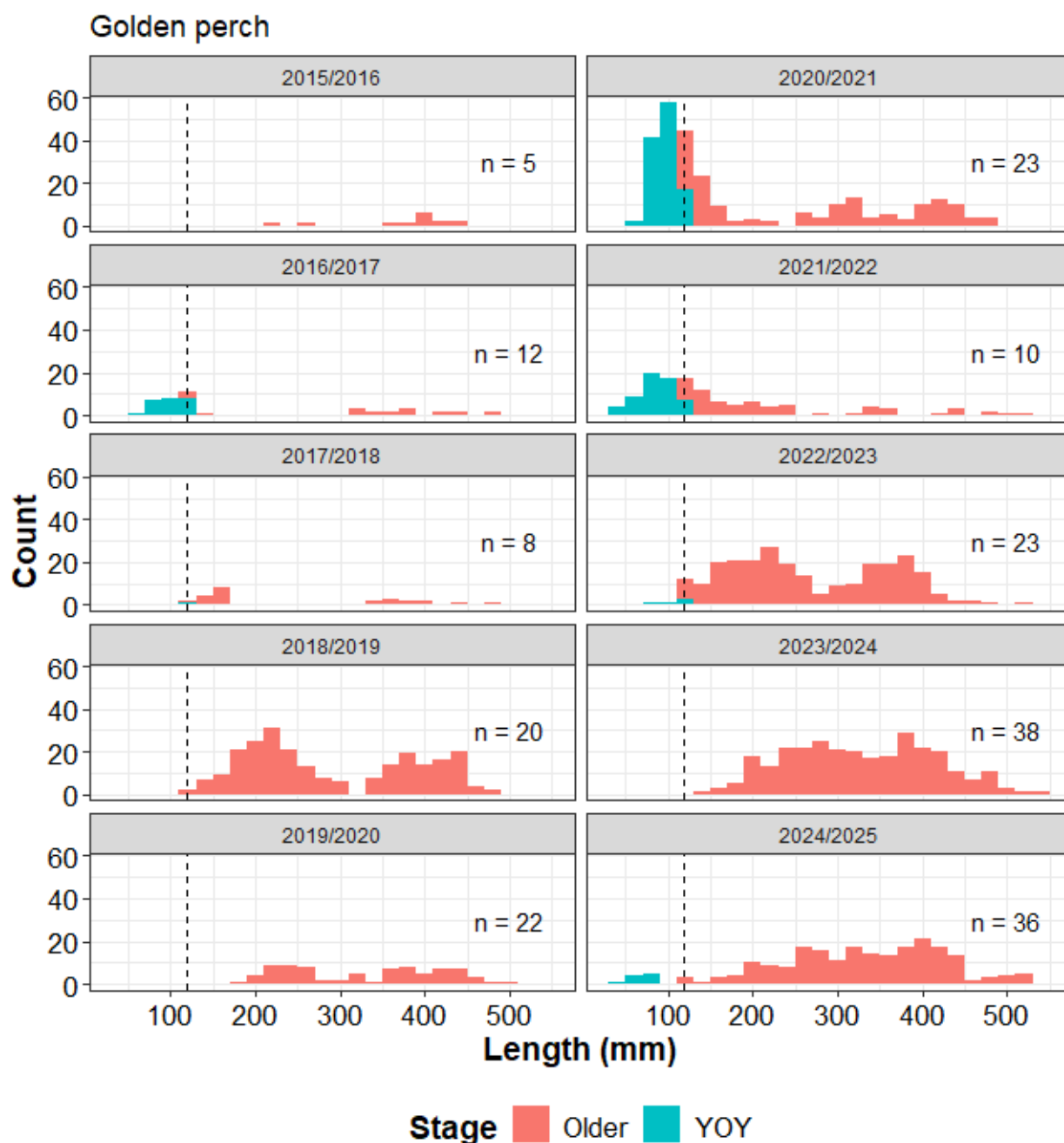


Figure 9.12: Length frequency plots for Golden perch by sampling season. YOY represents Young of the Year fish. n shows the number of sampling events in each season. Note some stages may appear either side of the cut-off line due to binning of data in the histogram.

9.8.1.1 Summary Statement:

Irregular recruitment. Low level of recruitment likely in 2024/25 following two years of likely recruitment failure. A range of Golden perch size classes were observed in 2024/25.

9.8.1.2 Stocking

A total of 120,200 Golden perch were stocked into the waterways of the New South Wales Lower Darling WRPAs during the reporting period. Of these fish, 0 (0%) were stocked into impoundments while 120,200 (100%) were stocked into rivers or creeks. Table 9.5 shows the detailed breakdown of stocking by season, location and life stage while Figure 9.13 shows the locations of stocking.

Table 9.5: Number and life stage of stocked Golden perch each sampling season.

Sampling Season	River/Creek or Impoundment	Life Stage	Number Stocked
2020/2021	River/Creek	Fry	120,000
2024/2025	River/Creek	Fingerling	200

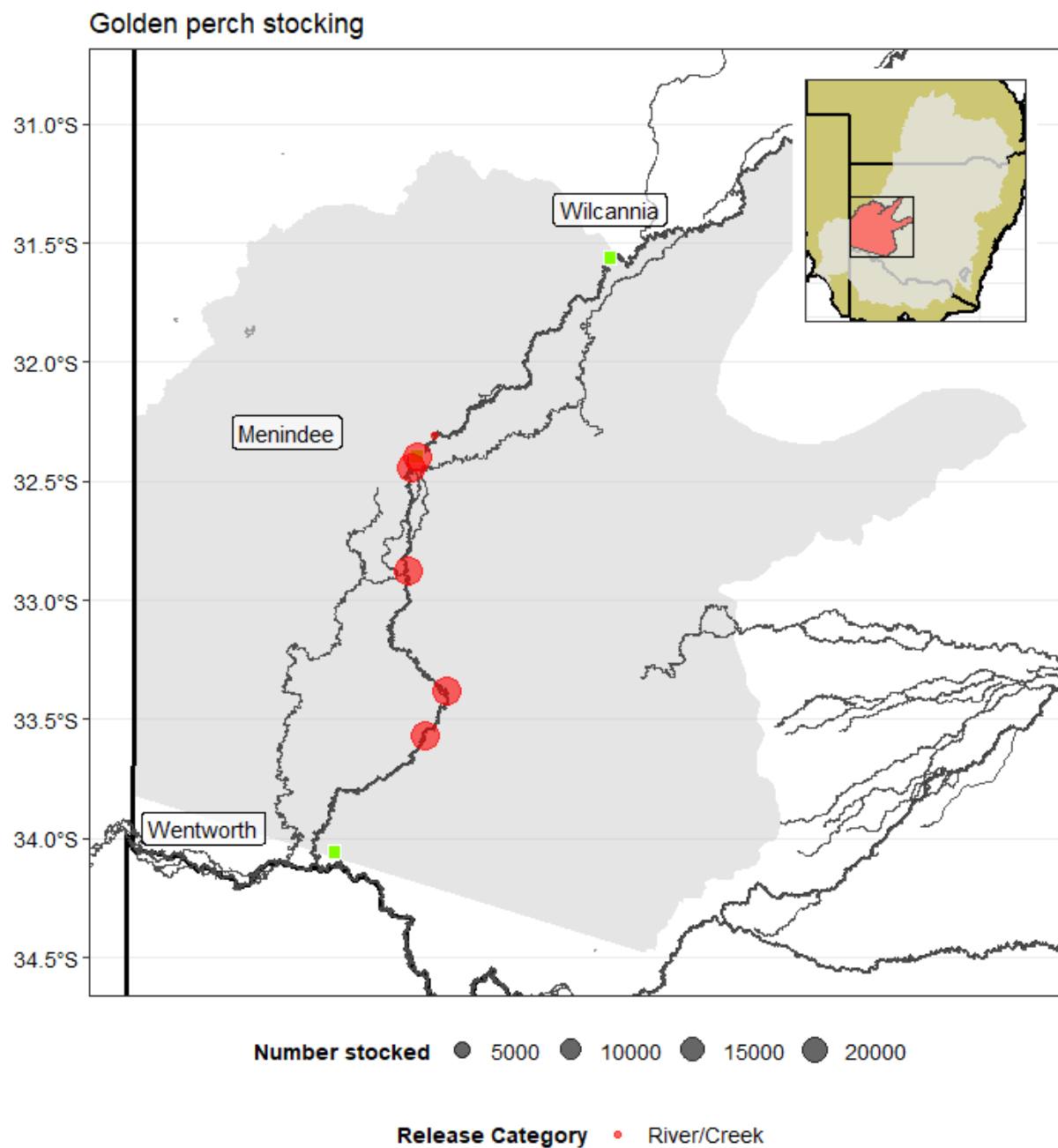


Figure 9.13: Locations of Golden perch stocking. Colours show whether a site was a river/creek site or an impoundment, while the size of the point reflects the total number of fish stocked over the reporting period. Green squares show key towns.

9.8.2 Temporal Trends in Abundance

The relative abundance and biomass of Golden perch since 1994 was modelled based on all suitable boat electrofishing data. The left-hand panels of Figure 9.14 show the abundance and biomass trends for the New South Wales Lower Darling WRPA and the right-hand panels show the overall trends across the NSW MDB.

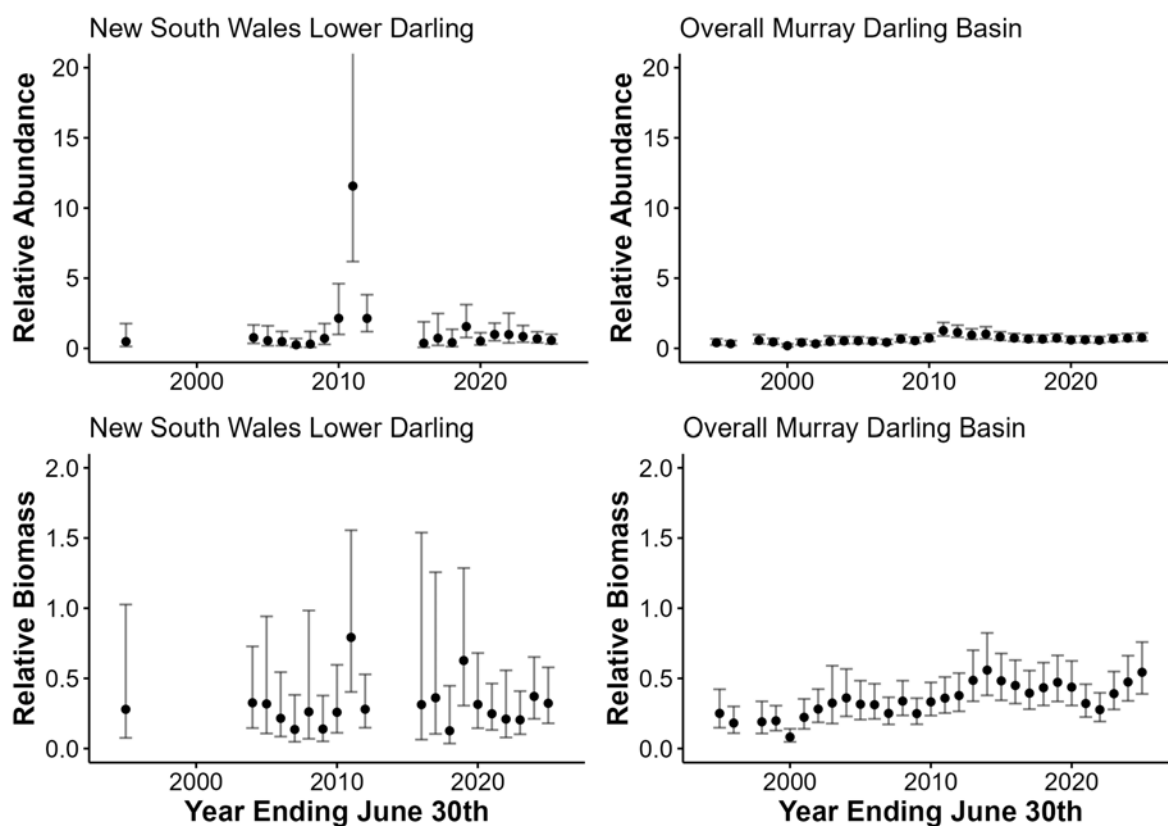


Figure 9.14: Relative abundance and biomass of Golden perch in both this WRPA and the overall Murray-Darling Basin. These are model estimates based upon all boat electrofishing data within the NSW DPIRD Freshwater ecosystem database and the output of generalised linear mixed models. Error bars show the 95% confidence intervals around the estimates. Some error bars may be truncated for clarity.

9.8.2.1 Summary Statement:

Golden perch abundance and biomass in the NSW Lower Darling WRPA declined sharply after a large peak in 2010/11 and have been relatively stable at lower levels in recent years. Recent abundance and biomass likely slightly lower than the broader NSW MDB.

9.8.3 Health

The prevalence of any health issues ranged from 4% of sampled fish in 2021/2022 to 48% of sampled fish in 2016/2017 (Figure 9.15). The most common health issue for Golden perch in the New South Wales Lower Darling water resource planning area was the presence of the parasite *Lernaea*, which was observed in a total of 267 fish, corresponding to 17% of all Golden perch measured.

Across the other WRPAs, 23% of Golden perch (1,681 out of 7,340 Golden perch) showed a health condition (excludes New South Wales Lower Darling).

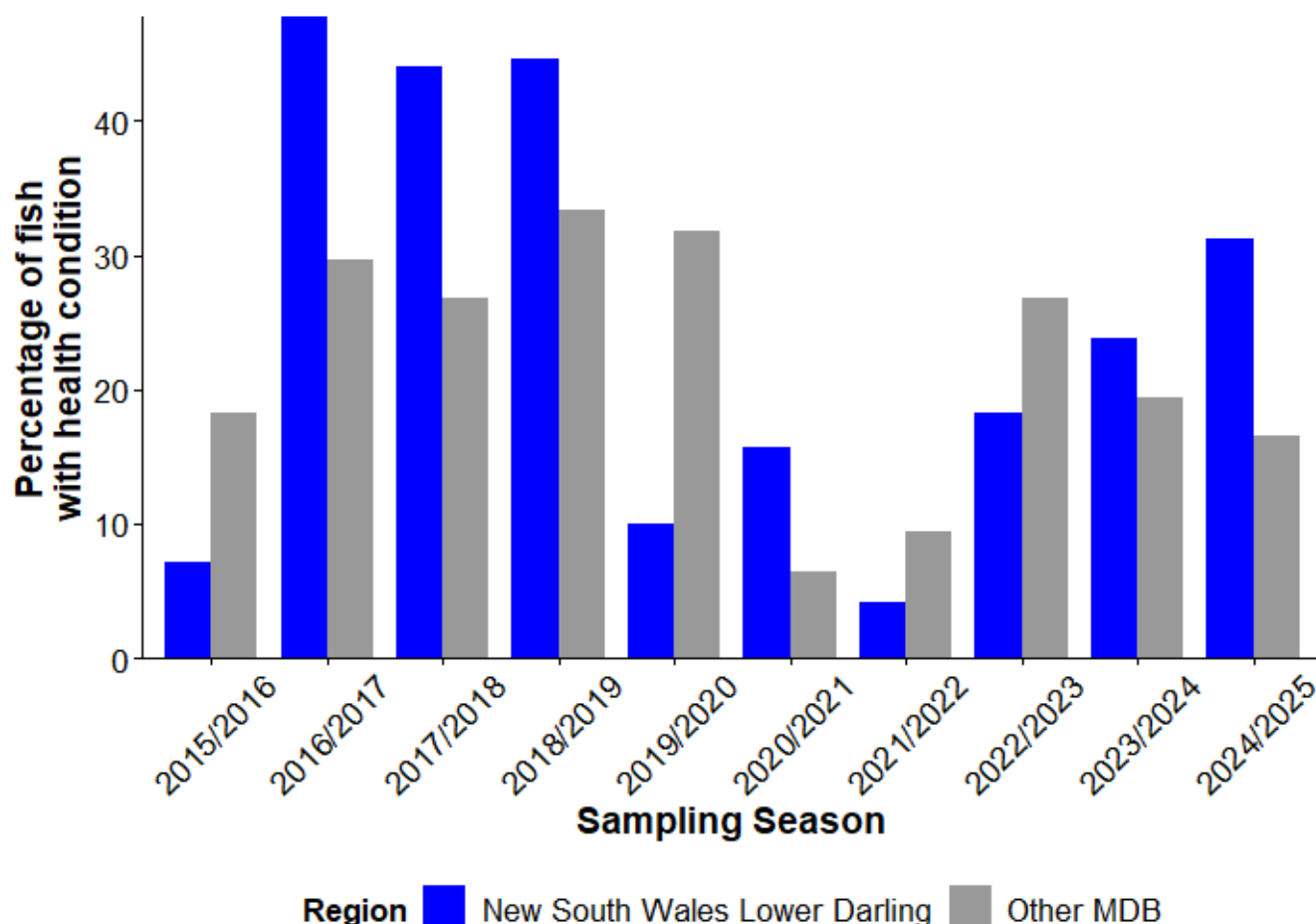


Figure 9.15: Timeseries showing the prevalence of health conditions in Golden perch. Blue shows the region-specific data while the grey shows the average across the other NSW MDB WRPAs.

9.8.3.1 Summary Statement:

The presence of observable health conditions for Golden perch in the New South Wales Lower Darling was variable and generally tracked the average across the rest of the Murray-Darling Basin. There was a moderate amount of health conditions observed in 2024/25.

9.8.4 Distribution

Golden perch were recorded at 72 out of 87 sites in the New South Wales Lower Darling WRP. The maximum observed relative abundance at a site was 2.6 fish caught per 90 seconds of electrofishing. Figure 9.16 shows the distribution and relative abundance of Golden perch across the New South Wales Lower Darling WRP.

9.8.4.1 Summary Statement:

Golden perch were generally present across the New South Wales Lower Darling region but less abundant north of Menindee Main Weir.

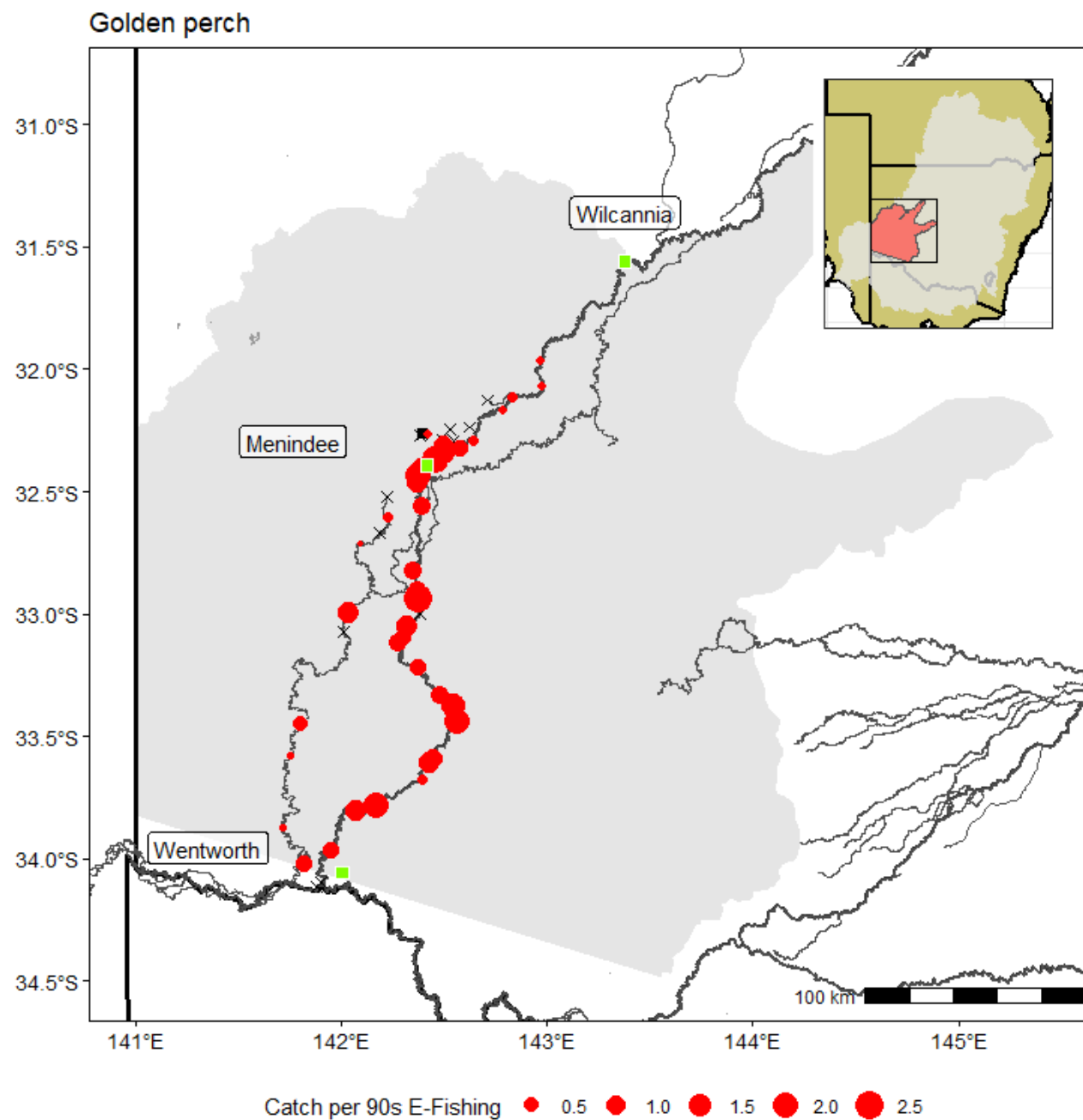


Figure 9.16: Distribution of Golden perch. Filled circles show sites where the species was present, and the size of the circle represents relative abundance. Sites that were sampled with electrofishing but did not contain the species are shown with an X. Green squares show key towns.

9.9 Freshwater catfish



9.9.0.1 Summary Statement:

Over the reporting period 0 Freshwater catfish were caught in the New South Wales Lower Darling WRPAs during standardised sampling. Overall, this suggests that Freshwater catfish only occur in very low abundances or are absent in the New South Wales Lower Darling WRPAs.

9.10 Bony herring



9.10.1 Population Structure

Figure 9.17 shows the observed length frequency plot for Bony herring for each of the sampling seasons. The observed numbers of Young of the Year (YOY) ranged from 7 to 733, and 5% to 73% of measured fish within a season, with a mean percentage YOY of 30%.

Overall, during the reporting period, across all the MDB water resource planning areas, the percentage YOY for Bony herring was 23% (11,230 out of 47,869). Bony herring are not a stocked species.

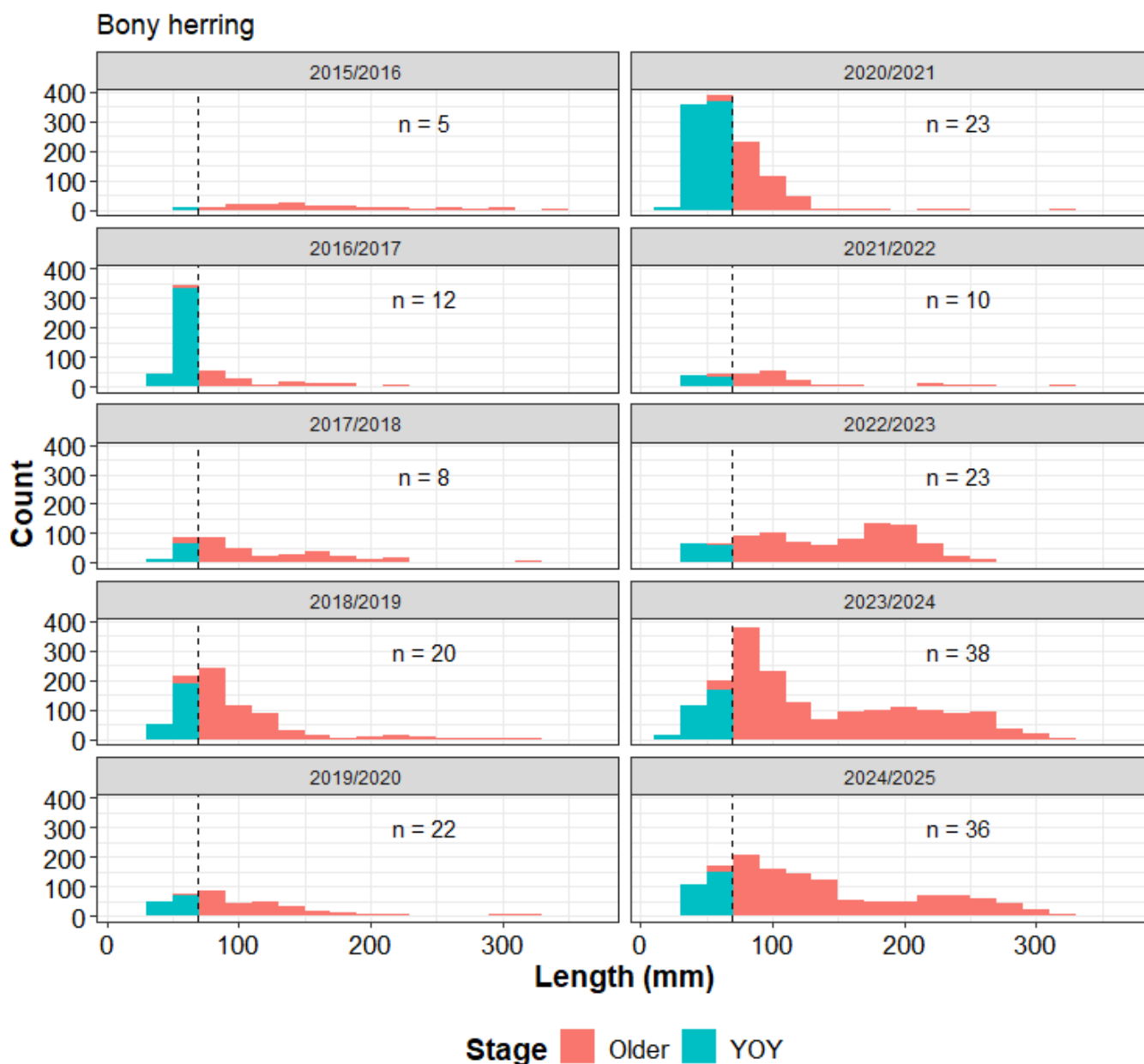


Figure 9.17: Length frequency plots for Bony herring by sampling season. YOY represents Young of the Year fish. n shows the number of sampling events in each season. Note some stages may appear either side of the cut-off line due to binning of data in the histogram.

9.10.1.1 Summary Statement:

Regular recruitment since 2016/17 but variable numbers of young-of-year and few large fish in most years. Higher proportions of large fish and good recruitment 2023/24 and 2024/25.

9.10.2 Temporal Trends in Abundance

The relative abundance and biomass of Bony herring since 1994 was modelled based on all suitable boat electrofishing data. The left-hand panels of Figure 9.18 show the abundance and biomass trends for the New South Wales Lower Darling WRPA and the right-hand panels show the overall trends across the NSW MDB.

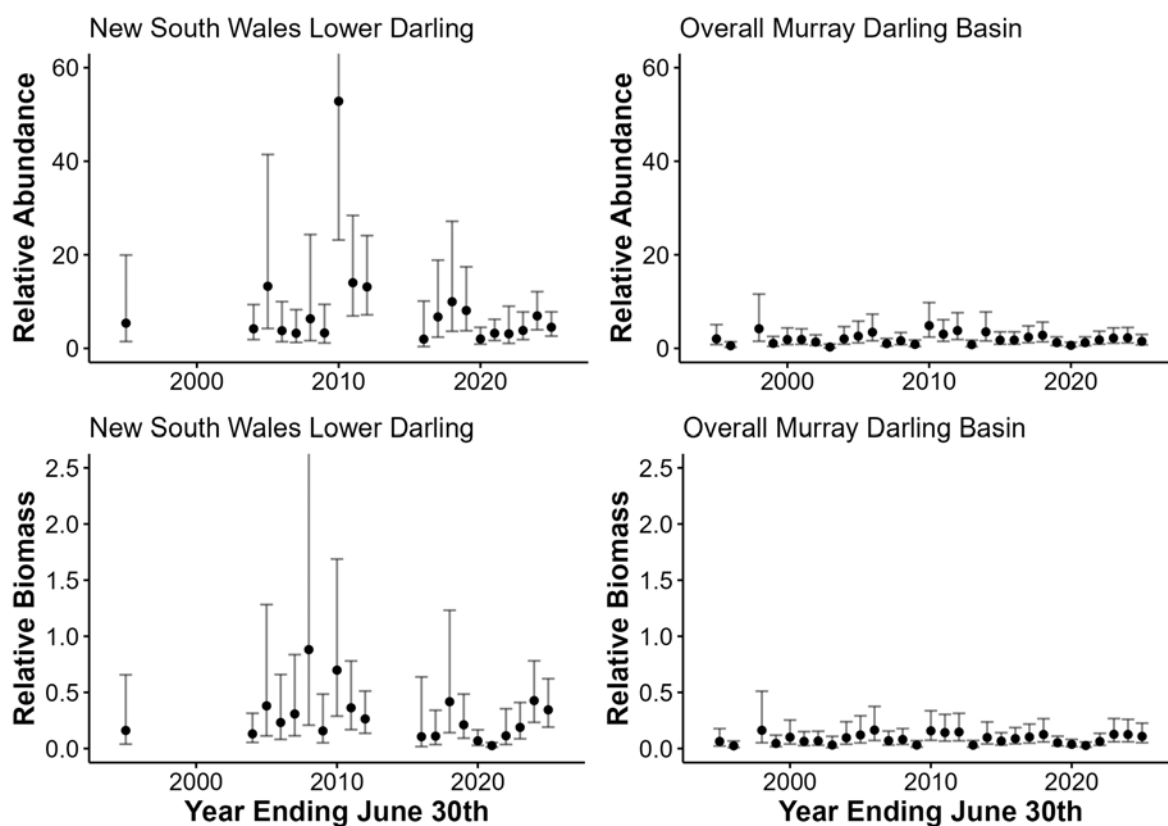


Figure 9.18: Relative abundance and biomass of Bony herring in both this WRPA and the overall NSW MDB. These are model estimates based upon all boat electrofishing data within the NSW DPIRD Freshwater ecosystem database and the output of generalised linear mixed models. Error bars show the 95% confidence intervals around the estimates. Some error bars may be truncated for clarity.

9.10.2.1 Summary Statement:

Fluctuations in abundance and biomass with peaks around 2010 and low values in 2019/20 and 2020/21. Abundance and biomass are stable or trending slightly up in recent years and are slightly higher than the overall NSW MDB.

9.10.3 Health

The prevalence of any health issues ranged from 0% of sampled fish in 2015/2016 to 13% of sampled fish in 2022/2023 (Figure 9.19). The most common health issue for Bony herring in the New South Wales Lower Darling WRPAs was Fungus, which was observed in a total of 106 fish, corresponding to 1% of all Bony herring measured.

Across the other NSW MDB WRPA, 1% of Bony herring (517 out of 47,871 Bony herring) showed a health condition (excludes the New South Wales Lower Darling WRPAs).

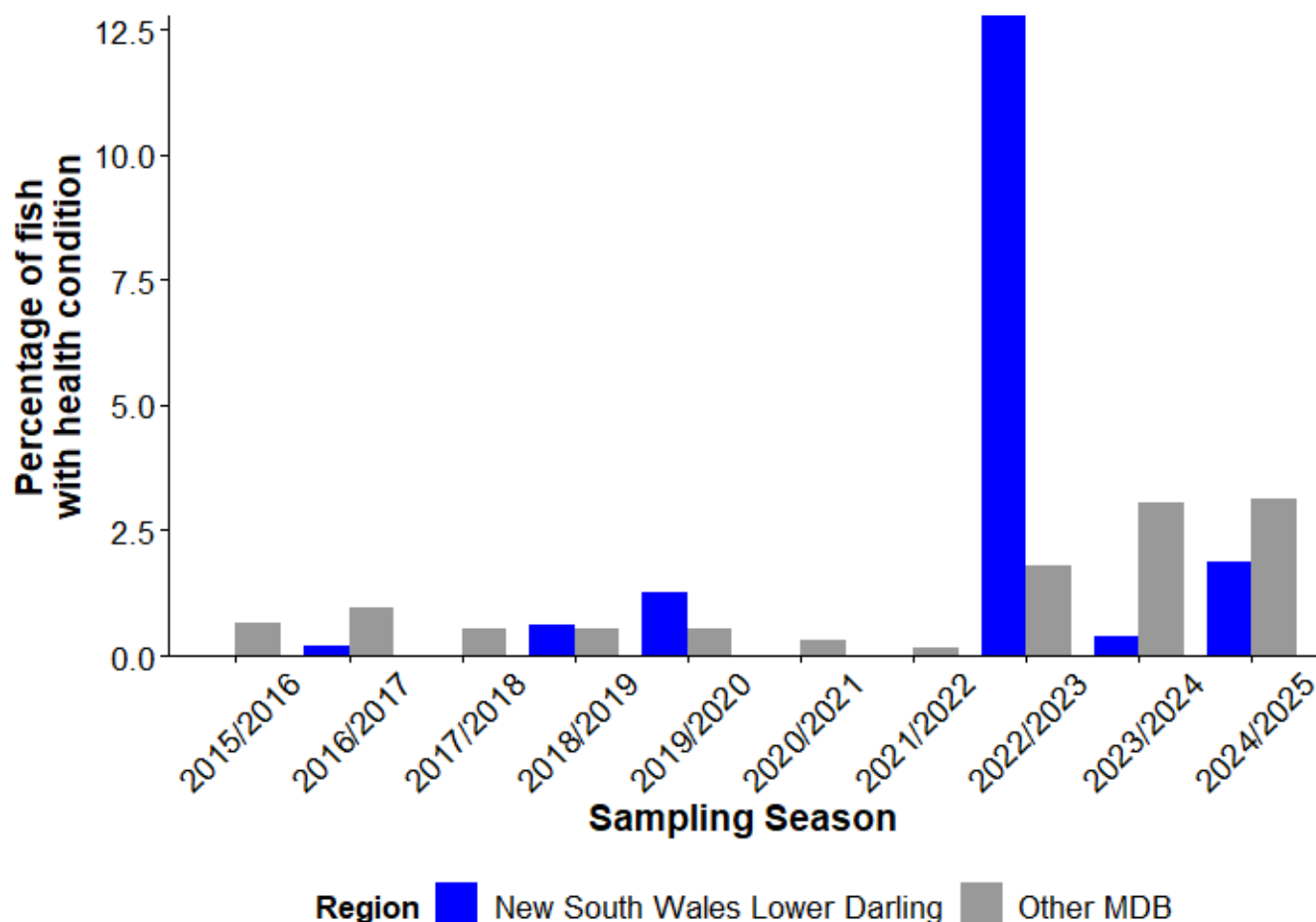


Figure 9.19: Timeseries showing the prevalence of health conditions in Bony herring. Blue shows the region-specific data while the grey shows the average across the other NSW MDB WRPA.

9.10.3.1 Summary Statement:

Presence of observable health conditions was low in all years and lower than or similar to the rest of the Murray-Darling Basin in all years except 2022/23 when the proportion was much higher.

9.10.4 Distribution

Bony herring were recorded at 85 out of 87 sites in the New South Wales Lower Darling WRP. The maximum observed relative abundance at a site was 64.5 fish caught per 90 seconds of electrofishing. Figure 9.20 shows the distribution and relative abundance of Bony herring across the New South Wales Lower Darling WRP.

9.10.4.1 Summary Statement:

Bony herring were recorded across the New South Wales Lower Darling WRP.

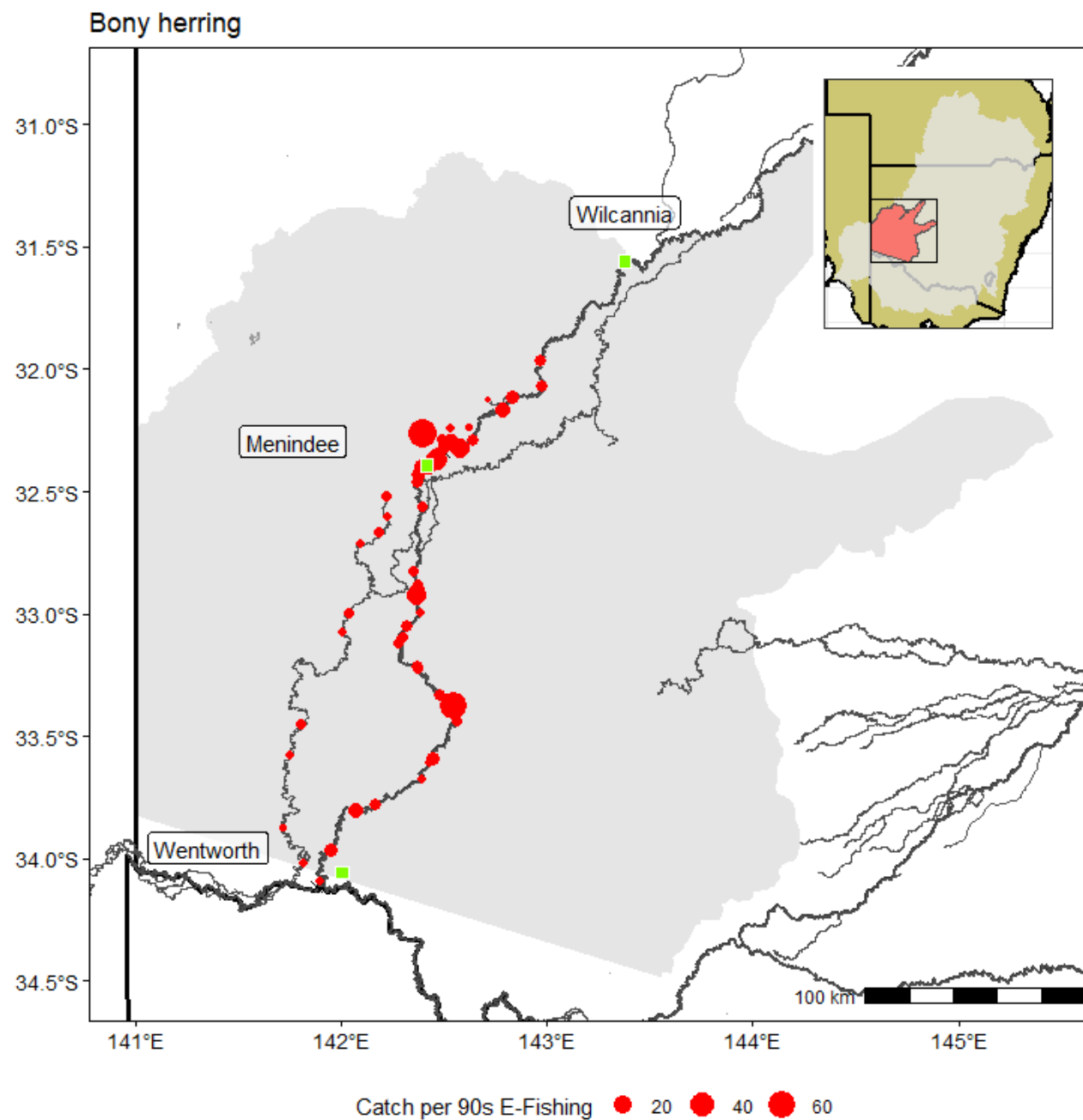


Figure 9.20: Distribution of Bony herring. Filled circles show sites where the species was present, and the size of the circle represents relative abundance. Sites that were sampled with electrofishing but did not contain the species are shown with an X. Green squares show key towns.

9.11 Australian smelt



9.11.1 Population Structure

Figure 9.21 shows the observed length frequency plot for Australian smelt for each of the sampling seasons. The observed numbers of Young of the Year (YOY) ranged from 2 to 39, and 4% to 88% of measured fish within a season, with a mean percentage YOY of 29%.

Overall, during the reporting period, across all the MDB water resource planning areas, the percentage YOY for Australian smelt was 43% (10,845 out of 25,020). Australian smelt are not a stocked species.

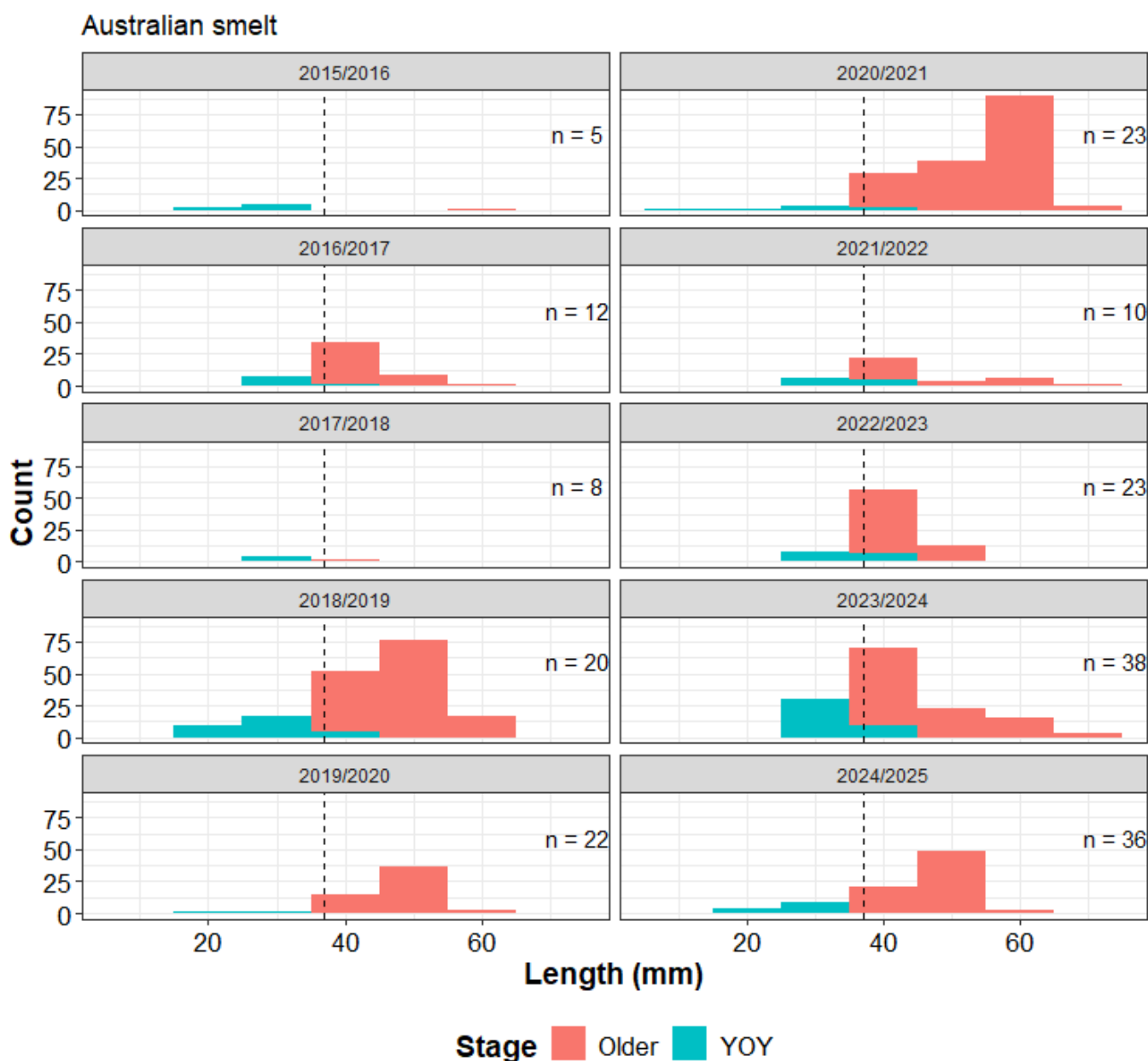


Figure 9.21: Length frequency plots for Australian smelt by sampling season. YOY represents Young of the Year fish. n shows the number of sampling events in each season. Note some stages may appear either side of the cut-off line due to binning of data in the histogram.

9.11.1.1 Summary Statement:

Evidence of regular recruitment with YOY and mature classes in most years. There was low recruitment and few large (>50 mm) fish in 2024/25.

9.11.2 Temporal Trends in Abundance

The relative abundance of Australian smelt since 1994 was modelled based on all suitable boat electrofishing data. The left-hand panel of Figure 9.22 show the abundance trends for the New South Wales Lower Darling WRP and the right-hand panel show the overall trend across the NSW MDB.

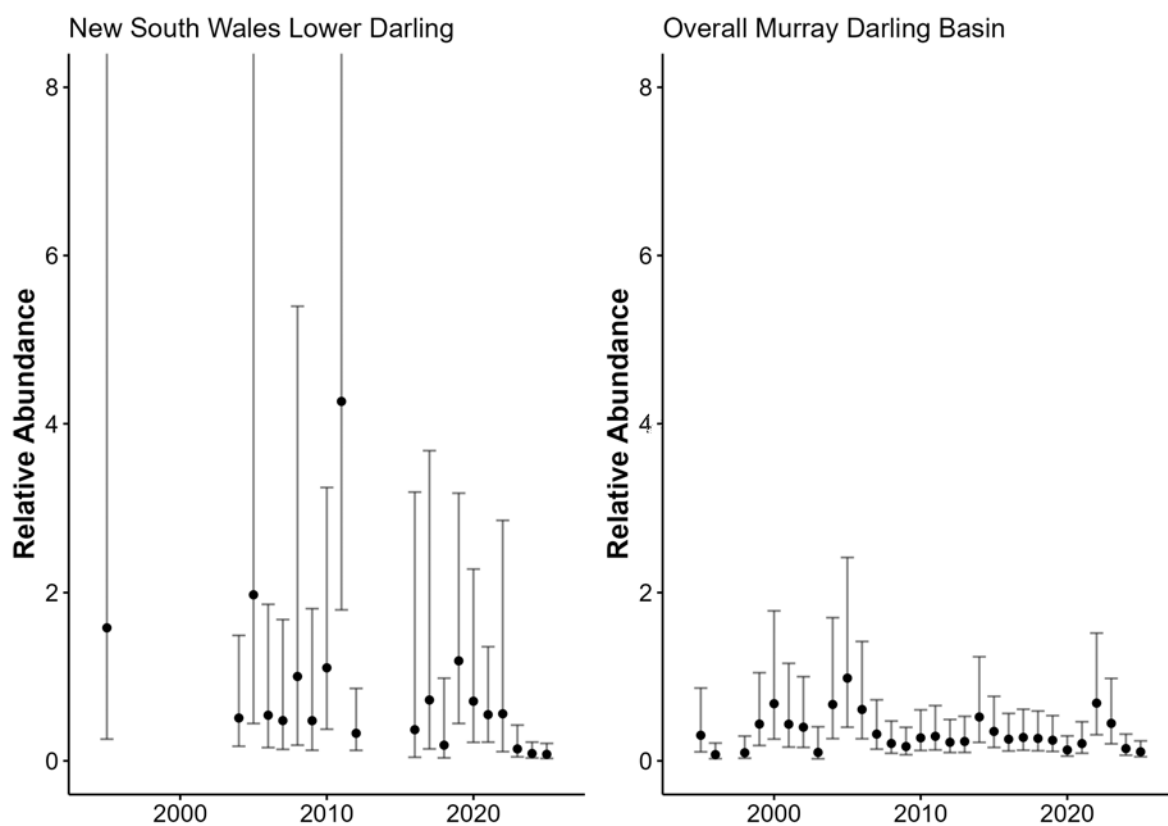


Figure 9.22: Relative abundance of Australian smelt in both this WRP and the overall NSW MDB. These are model estimates based upon all boat electrofishing data within the NSW DPIRD Freshwater ecosystem database and the output of generalised linear mixed models. Error bars show the 95% confidence intervals around the estimates. No modelling of biomass was done for Australian smelt. Some error bars may be truncated for clarity.

9.11.2.1 Summary Statement:

Abundance is currently very low for the the NSW Lower Darling and this is comparable to the wider NSW MDB. High abundances of Australian smelt were observed in this WRP in previous years.

9.11.3 Health

The prevalence of any health issues ranged from 0% of sampled fish in 2015/2016 to 1% of sampled fish in 2018/2019 (Figure 9.23). The most common health issue for Australian smelt in the New South Wales Lower Darling WRPAs was the presence of the parasite *Lernaea*, which was observed in a total of 2 fish, corresponding to <1% of all Australian smelt measured.

Across the other NSW MDB WRPA, <1% of Australian smelt (148 out of 25,022 Australian smelt) showed a health condition (excludes the New South Wales Lower Darling WRPAs).

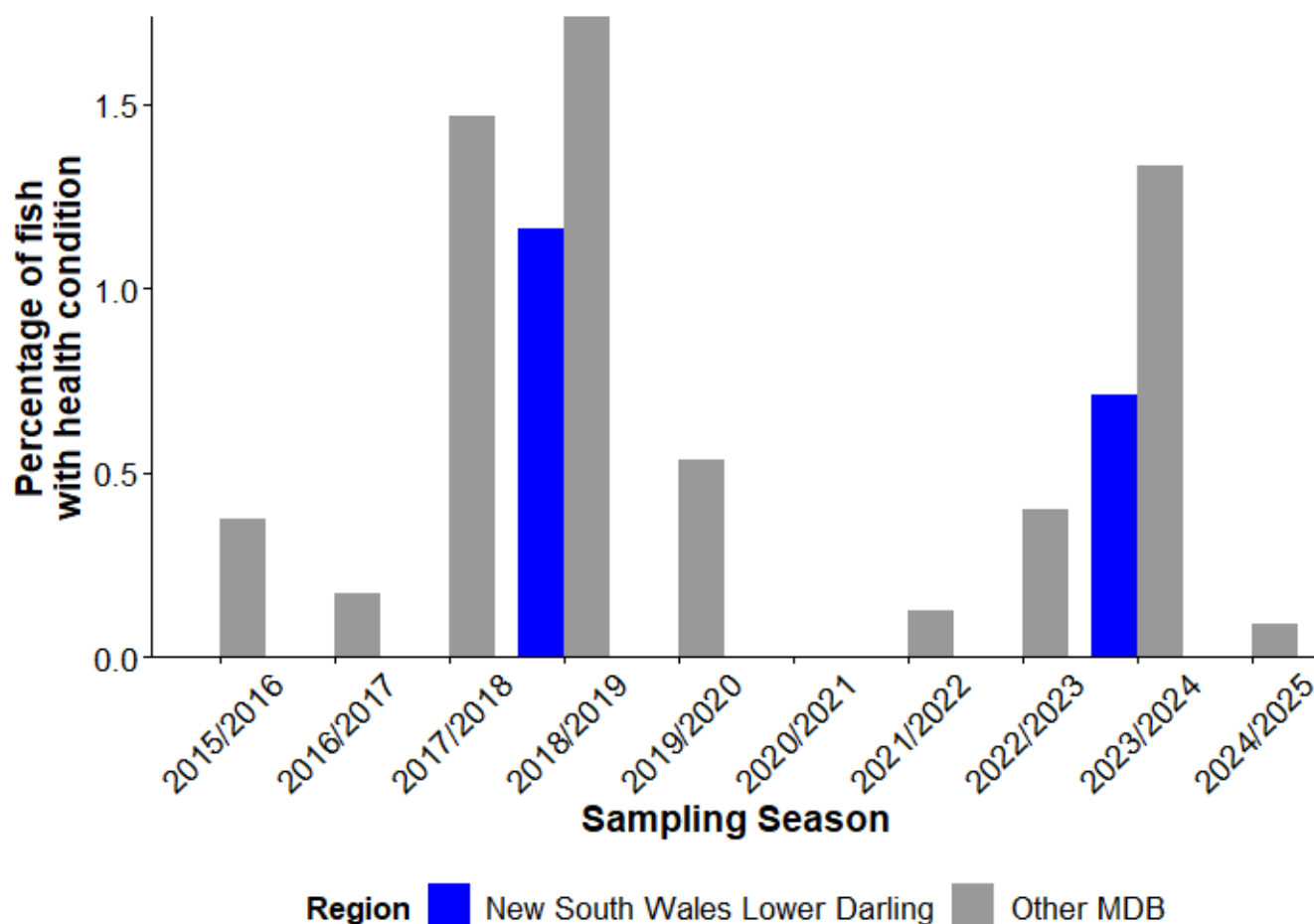


Figure 9.23: Timeseries showing the prevalence of health conditions in Australian smelt. Blue shows the region-specific data while the grey shows the average across the other NSW MDB WRPA.

9.11.3.1 Summary Statement:

Very few health issues were observed in Australian smelt in the NSW Lower Darling.

9.11.4 Distribution

Australian smelt were recorded at 63 out of 87 sites in the New South Wales Lower Darling WRP. The maximum observed relative abundance at a site was 3.8 fish caught per 90 seconds of electrofishing. Figure [9.24](#) shows the distribution and relative abundance of Australian smelt across the New South Wales Lower Darling WRP.

9.11.4.1 Summary Statement:

Australian smelt were recorded across the NSW Lower Darling.

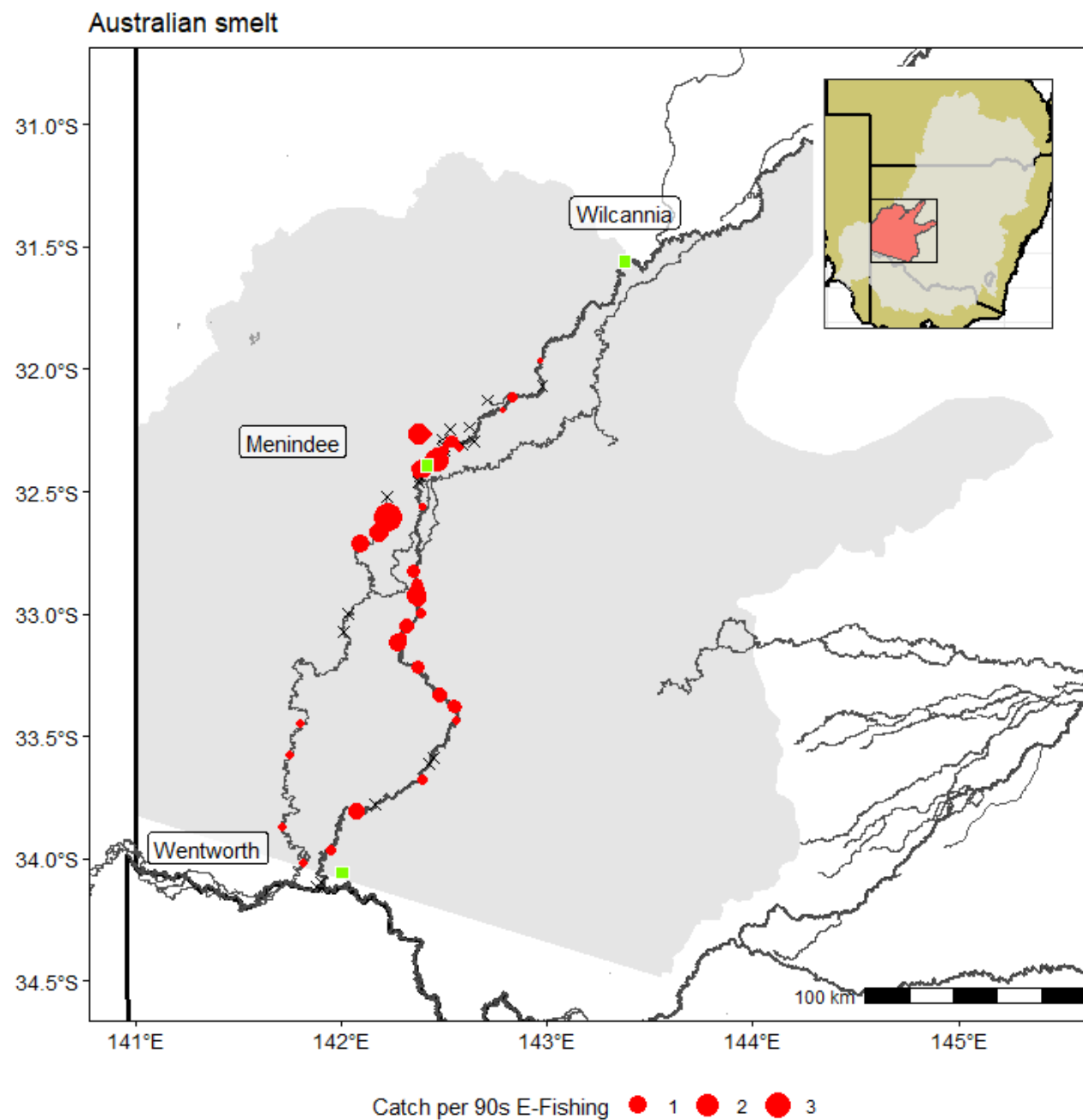


Figure 9.24: Distribution of Australian smelt. Filled circles show sites where the species was present, and the size of the circle represents relative abundance. Sites that were sampled with electrofishing but did not contain the species are shown with an X. Green squares show key towns.

9.12 Common carp



9.12.1 Population Structure

Figure 9.25 shows the observed length frequency plot for Common carp for each of the sampling seasons. The observed numbers of Young of the Year (YOY) ranged from 6 to 1,844, and 2% to 90% of measured fish within a season, with a mean percentage YOY of 43%.

Overall, during the reporting period, across all the MDB water resource planning areas, the percentage YOY for Common carp was 54% (32,836 out of 60,697). Common carp are not a stocked species.

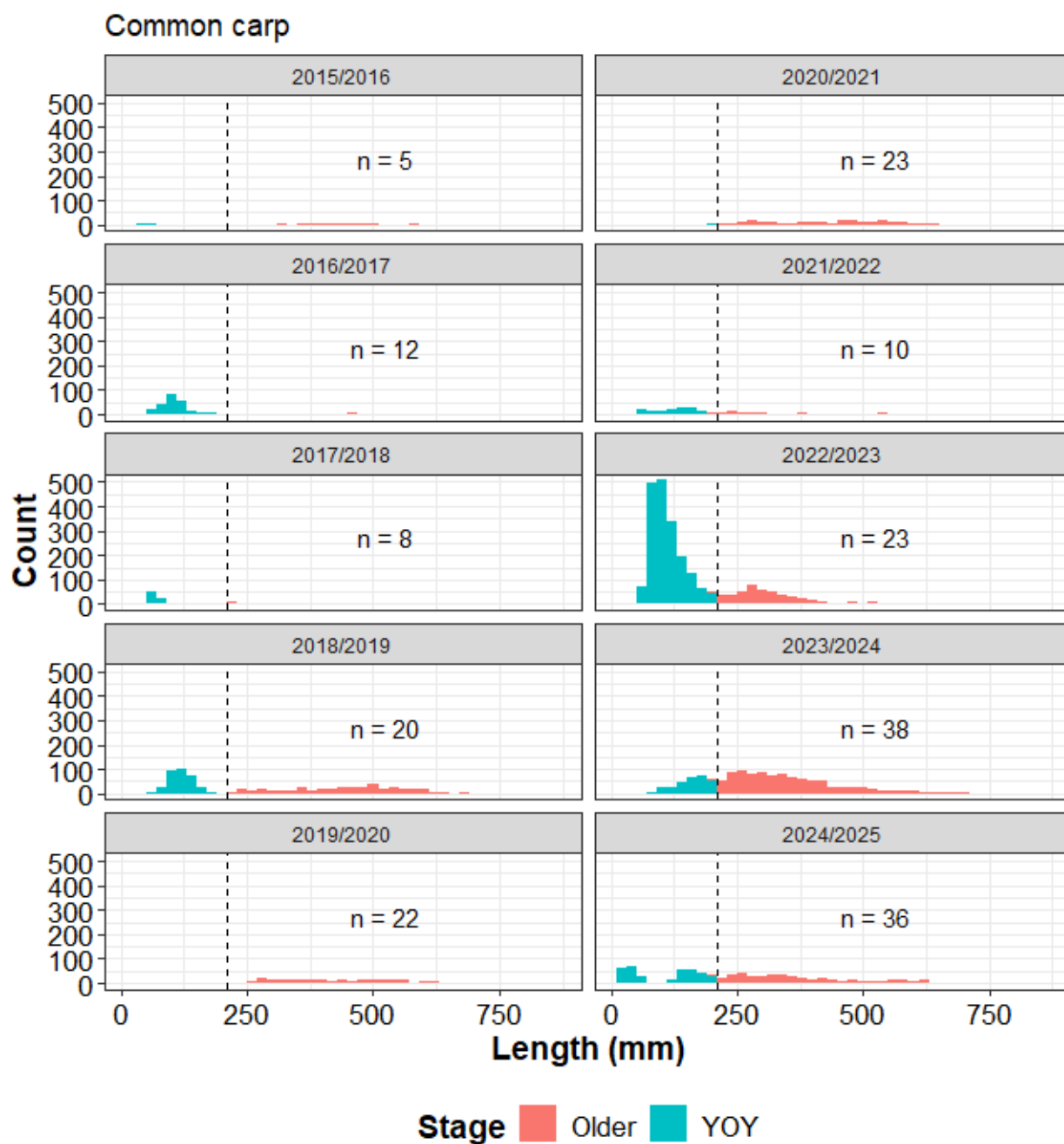


Figure 9.25: Length frequency plots for common carp by sampling season. YOY represents Young of the Year fish. n shows the number of sampling events in each season. Note some stages may appear either side of the cut-off line due to binning of data in the histogram.

9.12.1.1 Summary Statement:

Moderate recruitment of in 2024/25, following very strong recruitment in 2022/23.

9.12.2 Temporal Trends in Abundance

The relative abundance and biomass of Common carp since 1994 was modelled based on all suitable boat electrofishing data. The left-hand panels of Figure 9.26 show the abundance and biomass trends for the New South Wales Lower Darling WRPA and the right-hand panels show the overall trends across the NSW MDB.

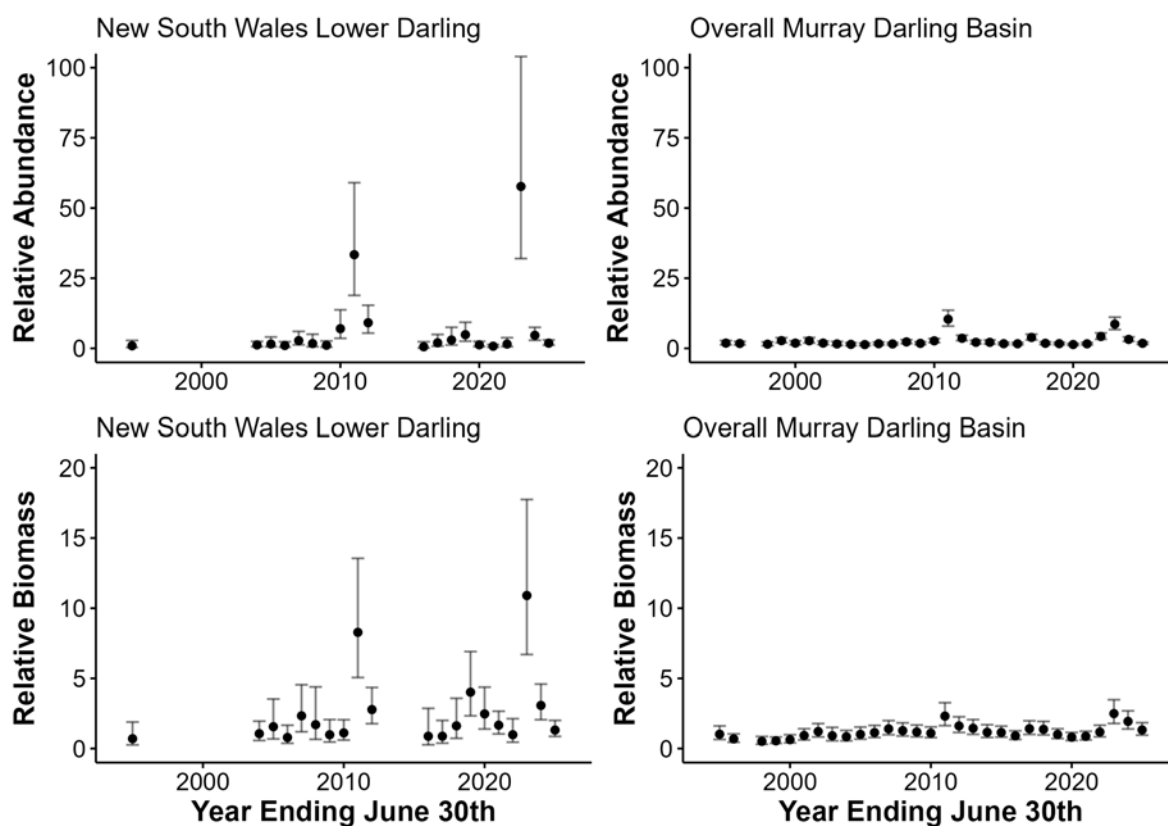


Figure 9.26: Relative abundance and biomass of Common carp in both this valley and the overall Murray-Darling Basin. These are model estimates based upon all electrofishing data within the NSW DPIRD Freshwater ecosystem database and the output of generalised linear mixed models. Error bars show the 95% confidence intervals around the estimates. Some error bars may be truncated for clarity.

9.12.2.1 Summary Statement:

Large increases in abundance and biomass after strong recruitment in 2022/23 have been followed by sharp declines. Abundance and biomass appear to be back at long term averages similar to the wider NSW MDB.

9.12.3 Health

The prevalence of any health issues ranged from <1% of sampled fish in 2022/2023 to 10% of sampled fish in 2024/2025 (Figure 9.27). The most common health issue for Common carp in the New South Wales Lower Darling water resource planning area was the presence of the parasite *Lernaea*, which was observed in a total of 111 fish, corresponding to 2% of all Common carp measured.

Across the other WRPAs, 4% of Common carp (2,211 out of 60,699 Common carp) showed a health condition (excludes New South Wales Lower Darling).

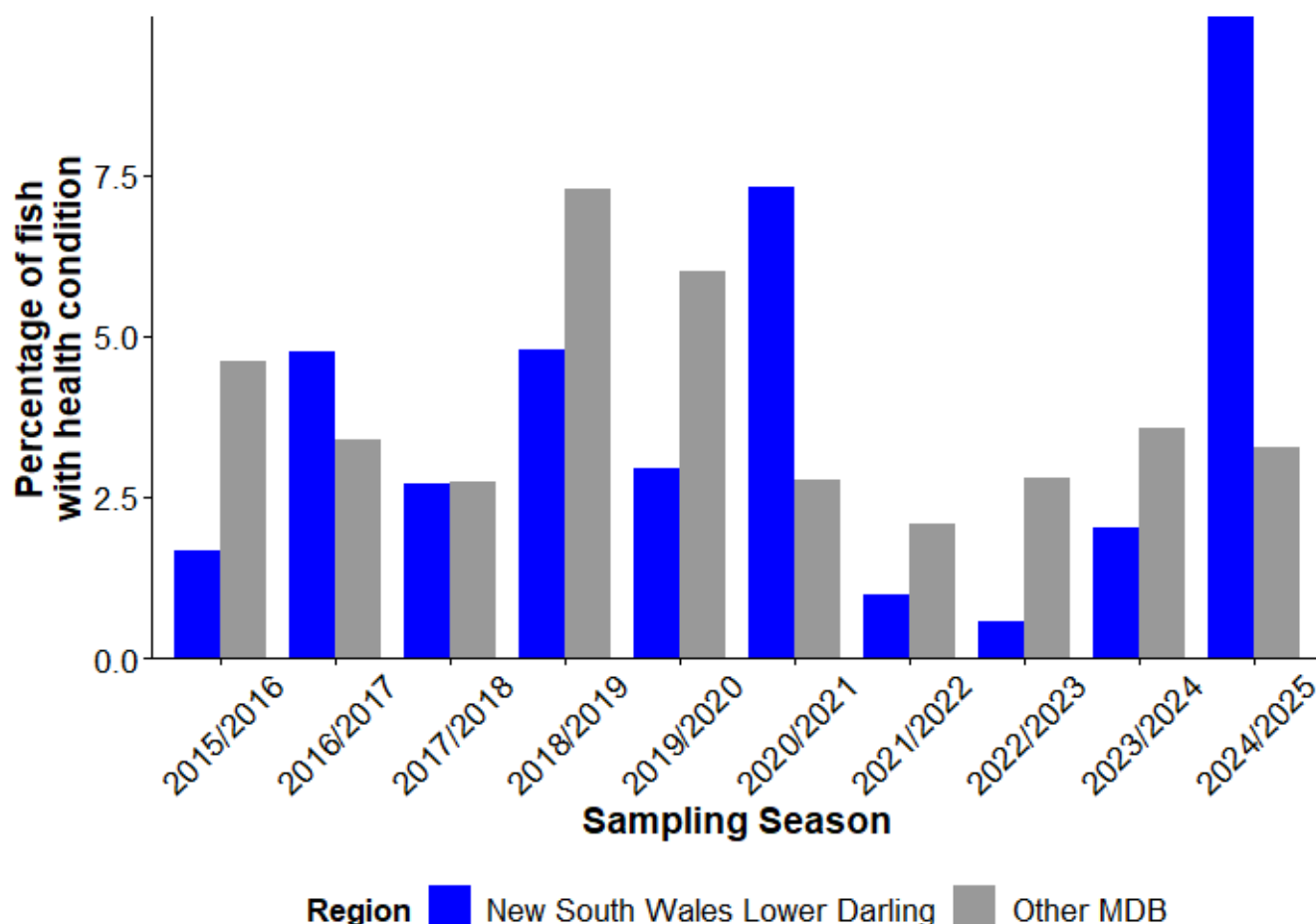


Figure 9.27: Timeseries showing the prevalence of health conditions in Common carp. Blue shows the region-specific data while the grey shows the average across the other NSW MDB WRPAs.

9.12.3.1 Summary Statement:

The presence of observable health conditions for Common carp in the NSW Lower Darling was low and generally similar to the wider NSW MDB. 2024/25 shows the highest proportion of health conditions in the time series and is more than double the rest of the NSW MDB.

9.12.4 Distribution

Common carp were recorded at 83 out of 87 sites in the New South Wales Lower Darling WRP. The maximum observed relative abundance at a site was 55.4 fish caught per 90 seconds of electrofishing. Figure 9.28 shows the distribution and relative abundance of Common carp across the New South Wales Lower Darling WRP.

9.12.4.1 Summary Statement:

Common carp were found in relatively high abundance across the NSW Lower Darling region.

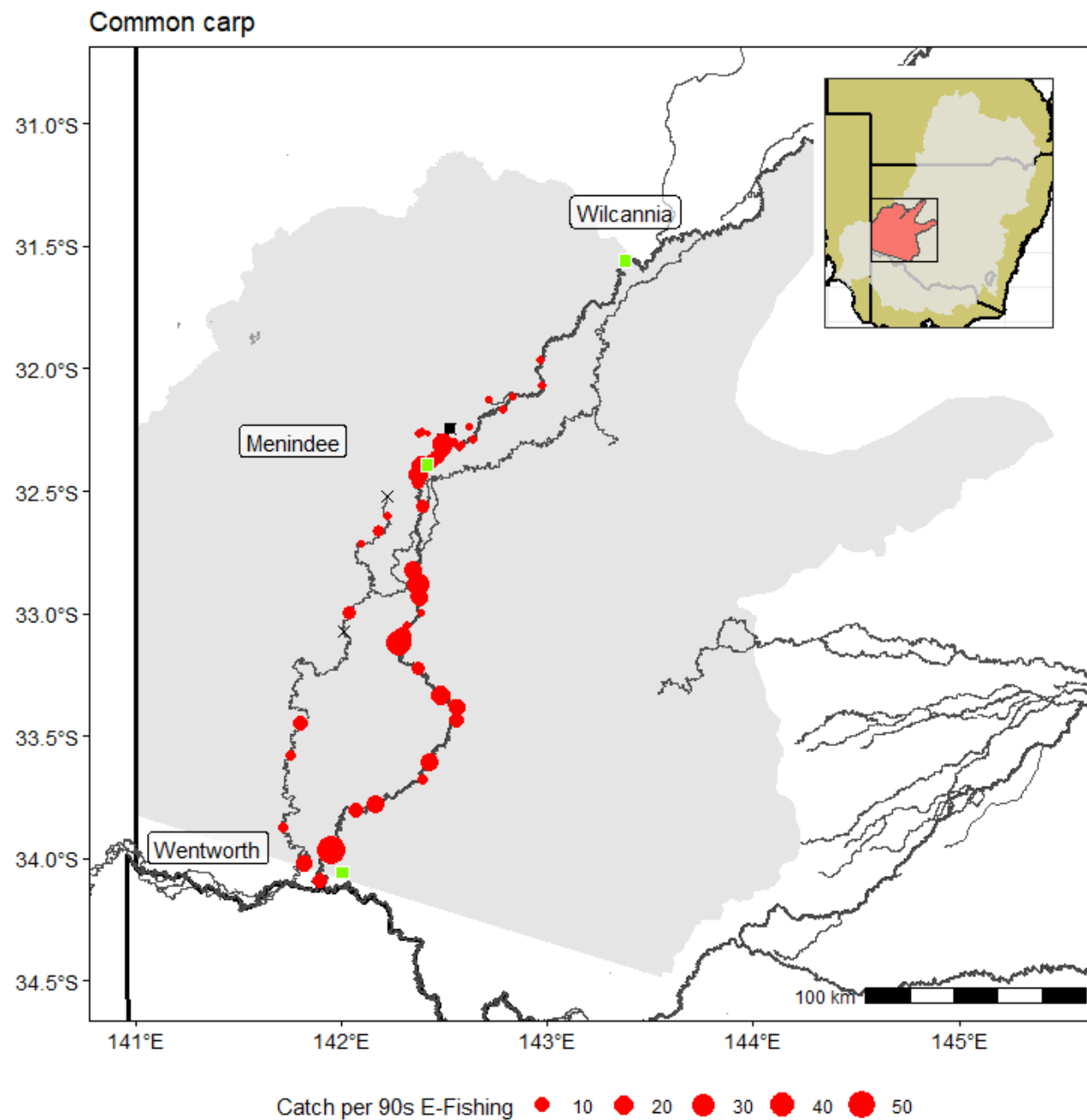


Figure 9.28: Distribution of Common carp. Filled circles show sites where the species was present, and the size of the circle represents relative abundance. Sites that were sampled with electrofishing but did not contain the species are shown with an X. Green squares show key towns.

9.13 Threatened Species

The following table (Table 9.6) shows the fish species listed under either the *NSW Fisheries Management Act 1994* (FMA) or the *Commonwealth Environmental Protection and Biodiversity Conservation Act 1999* (EPBC) which were observed in the New South Wales Lower Darling Water Resource Planning Area during the reporting period. A list of all threatened fish species observed by NSW DPIRD Fisheries (as part of any sampling program in any area) is provided in Table 9.10.

Table 9.6: Listed species which were observed in this region during the sampling period.

Species	Common name	Total caught	Total observed (not caught)
<i>Ambassis agassizii</i>	Olive perchlet	1	0
<i>Bidyanus bidyanus</i>	Silver perch	27	0
<i>Maccullochella peelii</i>	Murray cod	365	118

The following pages provide more information on where each species was caught.

Olive perchlet

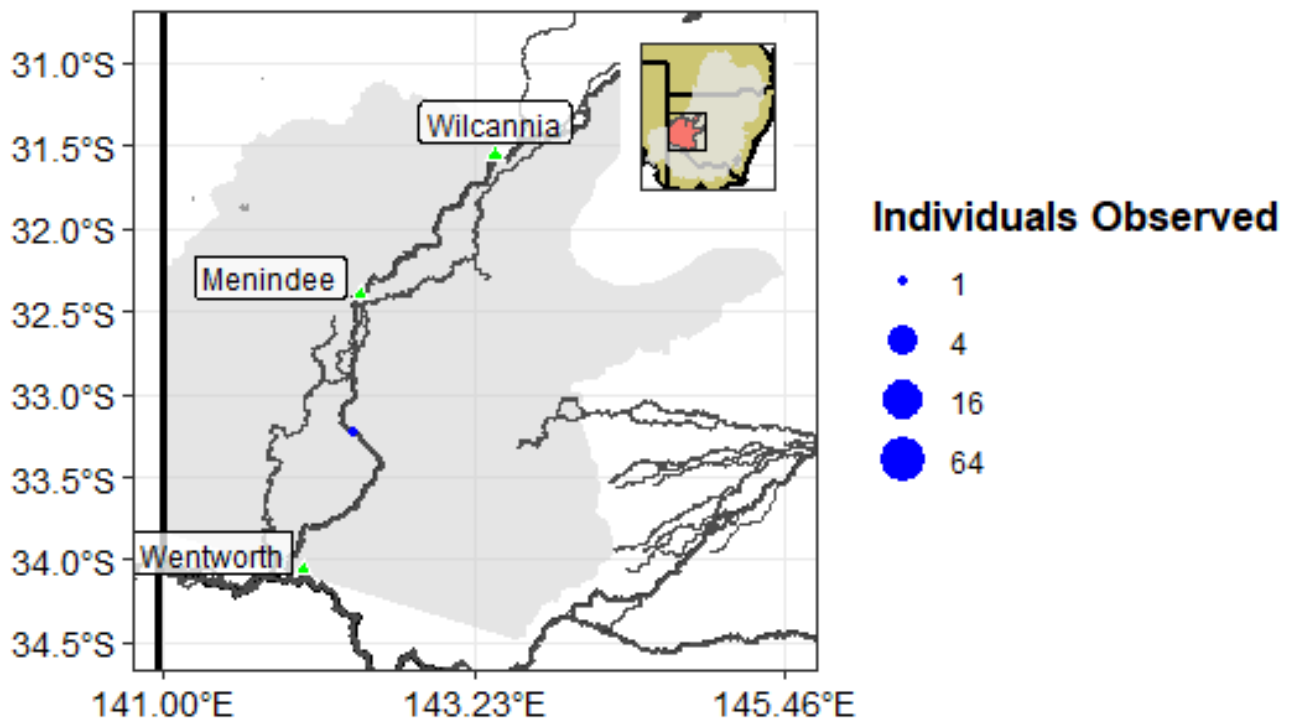


Figure 9.29: Distribution of the observed threatened species. Filled circles show sites where the species was present, and the size of the circle represents number of observed individuals abundance. Green triangles show key towns.

9.13.0.1 Summary Statement:

One Olive perchlet was caught in the Lower Darling near Moorara in 2023 during electrofishing sampling. Another Olive perchlet was observed in 2022 in a fyke net in Balaka Lake (fyke net data is not included in most of this report but see Table 9.11).

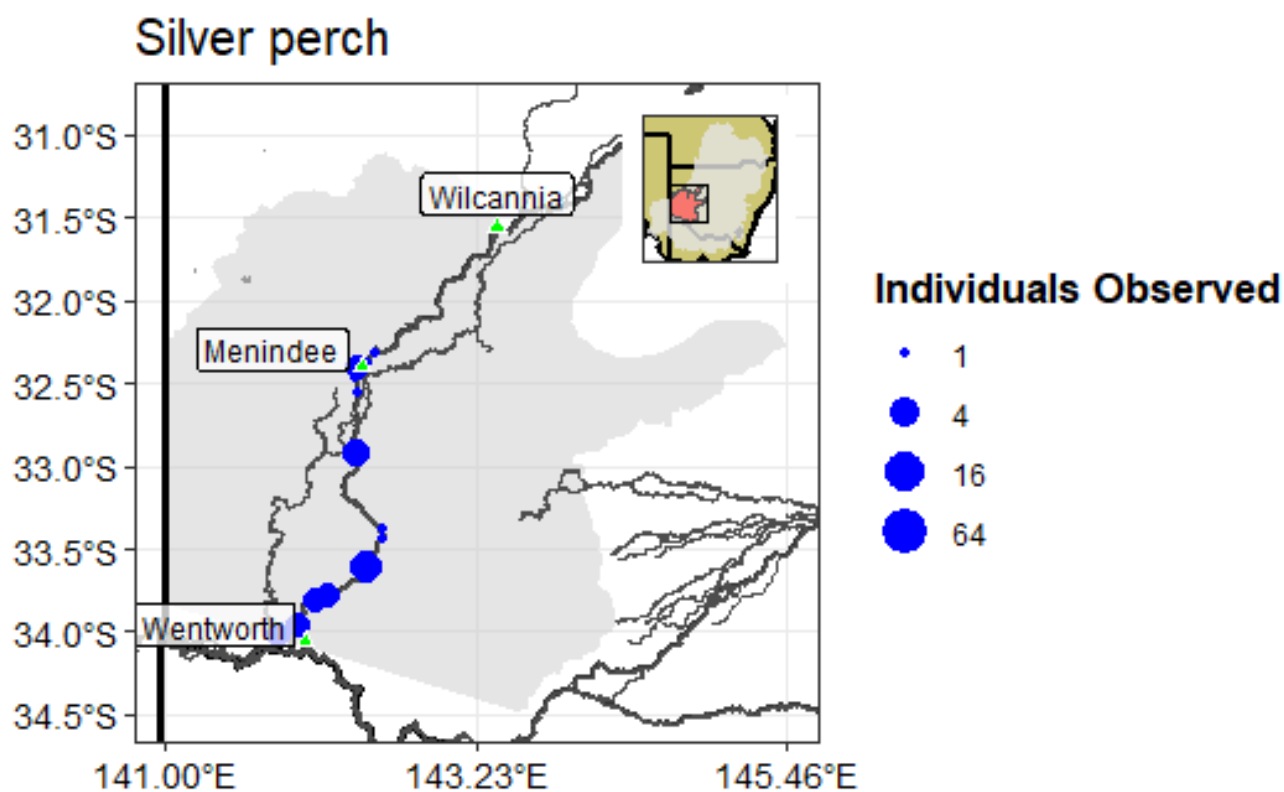


Figure 9.30: Distribution of the observed threatened species. Filled circles show sites where the species was present, and the size of the circle represents number of observed individuals abundance. Green triangles show key towns.

9.13.0.2 Summary Statement:

A total of 27 Silver perch were caught at 15 sites in the New South Wales Lower Darling region. Individuals were caught in all sampling seasons except 2015/16 and 2017/18. Nine individuals across 5 sites were caught in 2024/25.

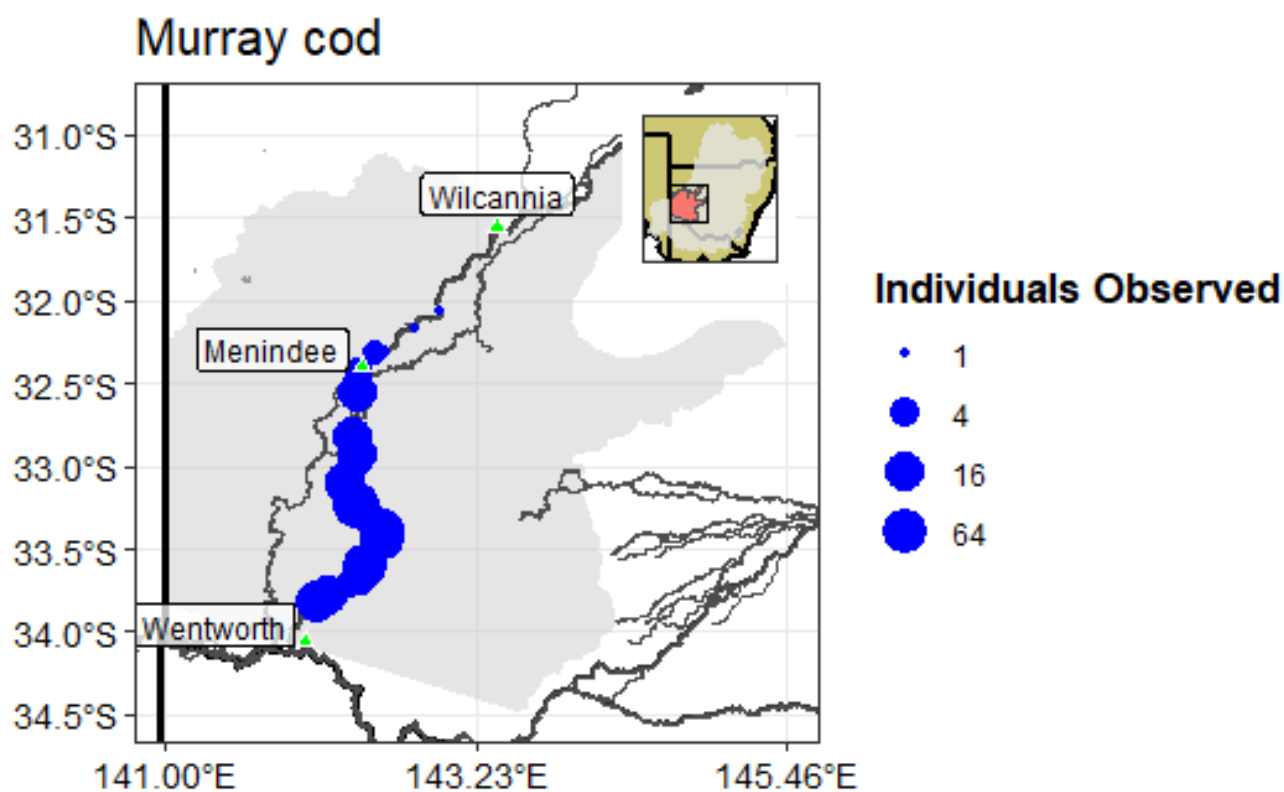


Figure 9.31: Distribution of the observed threatened species. Filled circles show sites where the species was present, and the size of the circle represents number of observed individuals abundance. Green triangles show key towns.

9.13.0.3 Summary Statement:

A total of 365 Murray cod were caught in the New South Wales Lower Darling region. See the Murray cod section of this chapter for more details.

9.14 Appendix

This report contains data from the projects listed in Table 9.7.

Table 9.7: Projects included in this report. Sampling Events show the total number of sampling events included from each project. Sampling Seasons shows which sampling seasons each project contributed data to.

Project Name	Sampling Seasons	Sampling Events
Basin Plan Environmental Outcomes Monitoring	2015/2016, 2016/2017, 2017/2018, 2018/2019, 2019/2020	32
Basin Plan Environmental Outcomes Monitoring 2	2022/2023, 2023/2024, 2024/2025	37
Darling E flows	2020/2021, 2021/2022, 2022/2023, 2023/2024	43
Darling River Health	2023/2024, 2024/2025	62
FlowMER2.0 - Northern Basin	2024/2025	16
Lower Darling Recovery	2018/2019, 2019/2020, 2020/2021, 2022/2023, 2023/2024	77
Murray-Darling Basin Fish Surveys	2015/2016, 2016/2017, 2017/2018, 2018/2019, 2020/2021, 2021/2022, 2022/2023, 2023/2024, 2024/2025	18

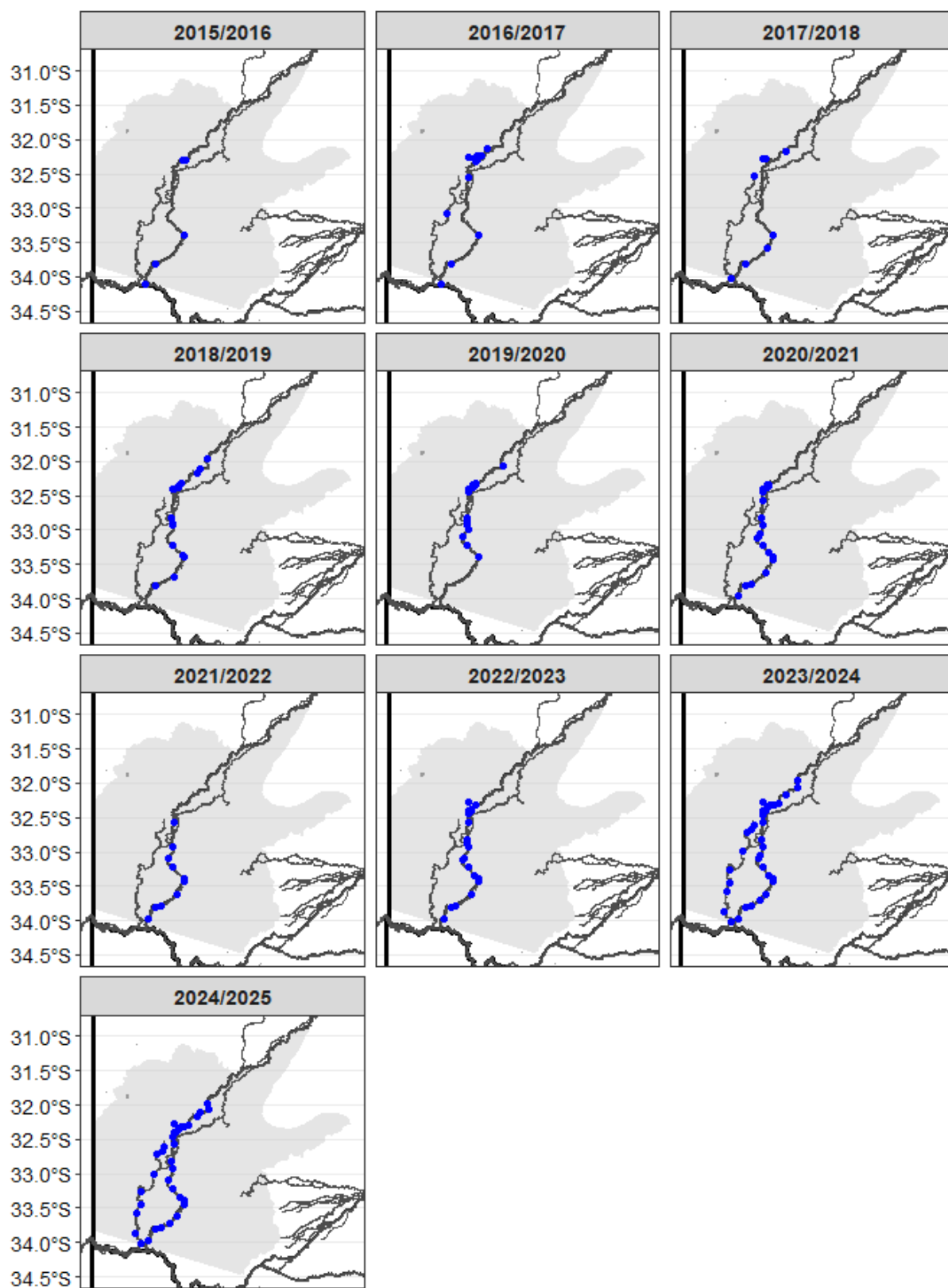


Figure 9.32: Sites sampled and included in this report by sampling season. Dry sites are not shown.

Table 9.8 shows all species detected during this survey period as part of standardised monitoring projects (see Table 9.7). Note there are variations in effort between sampling seasons so this information should be considered in conjunction with Table 9.1. The Expected from Modelling column identifies species which are possible to occur based upon MaxENT habitat modelling (likelihood threshold > 0.33; NA represents no modelling was undertaken). Species that were possible from the modelling but not observed during standardised sampling in the New South Wales Lower Darling WSPA were: Murray hardyhead, Flat-headed galaxias, Macquarie perch, Trout cod, Southern purple-spotted gudgeon, Flathead gudgeon, Dwarf flathead gudgeon, Freshwater catfish. It should be noted that the MaxENT modelling models habitat availability and is not always a reliable index of abundance, it merely indicates possible distribution based upon habitat. A full list of species observed during this period across the standardised monitoring protocols and sampling methods is presented in Table 9.11.

Table 9.8: Total number caught of each species by sampling season. Sampling season refers to the July-June ending June 30th of the specified year.

Common name	Expected from modelling	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Australian smelt	YES	8	50	6	172	57	166	39	93	141	85
Bony herring	YES	160	1,665	858	2,431	393	1,902	490	1,261	2,593	1,998
Carp gudgeon species complex	YES	621	225	1,380	1,898	204	266	28	1	327	627
Common carp	NA	60	311	239	796	238	245	318	16,134	1,794	839
Common carp - Goldfish hybrid	NA	0	0	0	0	0	0	0	1	0	0
Eastern gambusia	NA	16	159	71	88	4	21	7	20	6	23
Golden perch	YES	14	42	23	233	78	265	122	246	288	212
Goldfish	NA	48	16	10	137	5	9	16	593	141	150
Murray cod	YES	12	5	11	96	20	119	17	17	43	25
Murray-Darling rainbowfish	YES	0	6	0	0	0	9	3	1	1	0
Olive perchlet	YES	0	0	0	0	0	0	0	1	0	0
Redfin	YES	0	0	0	0	0	0	0	0	2	0
Silver perch	YES	0	1	0	5	1	2	2	2	5	9
Spangled perch	YES	0	2	0	0	0	0	3	185	52	26

(continued)

Common name	Expected from modelling	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Unspecked hardyhead	YES	1	4	0	0	0	1	0	0	0	0

The following table summaries the sampling methods for each species caught (Table 9.9).

Table 9.9: Total catch of each species by sampling method.

Common name	Backpack Electrofishing	Bait Trap	Boat Electrofishing
Australian smelt	0	2	815
Bony herring	4	11	13,736
Carp gudgeon species complex	7	4,837	733
Common carp	10	466	20,498
Common carp - Goldfish hybrid	0	0	1
Eastern gambusia	2	30	383
Golden perch	0	5	1,518
Goldfish	1	6	1,118
Murray cod	0	0	365
Murray-Darling rainbowfish	0	0	20
Olive perchlet	0	0	1
Redfin	0	0	2
Silver perch	0	0	27
Spangled perch	2	11	255
Unspecked hardyhead	0	0	6

Table 9.10: Listed threatened species recorded in the Murray-Darling Basin (from the NSW DPIRD Fisheries Freshwater Ecosystem research database). Species are listed under either the NSW Fisheries Management Act 1994 (FMA) or the Commonwealth Environmental Protection and Biodiversity Conservation Act 1999 (EPBC)

Genus, species	Common Name	EPBC Status	FMA Status
<i>Ambassis agassizii</i>	Agassiz's glassfish, olive perchlet, western New South Wales population	NA	Endangered Population
<i>Bidyanus bidyanus</i>	Silver Perch, Bidyan	Endangered	Vulnerable
<i>Craterocephalus fluviatilis</i>	Murray Hardyhead	Endangered	Critically Endangered
<i>Galaxias rostratus</i>	Flathead Galaxias, Beaked Minnow, Flat-headed Galaxias, Flat-headed Jollytail, Flat-headed Minnow	Critically Endangered	Critically Endangered
<i>Galaxias tantangara</i>	Stocky Galaxias	NA	Critically Endangered
<i>Maccullochella macquariensis</i>	Trout Cod	Endangered	Endangered
<i>Maccullochella peelii</i>	Murray Cod	Vulnerable	NA
<i>Macquaria australasica</i>	Macquarie Perch	Endangered	Endangered
<i>Mogurnda adspersa</i>	Southern Purple Spotted Gudgeon	NA	Endangered
<i>Nannoperca australis</i>	Southern Pygmy Perch	Vulnerable	Endangered
<i>Tandanus tandanus</i>	Freshwater catfish, eel tailed catfish, Murray-Darling Basin population	NA	Endangered Population

Table 9.11 shows all species detected during this survey period across all programs and methods. Due to variations in project methods protocols, this data is presented only to give a complete list of species observed in the region. The Expected from Modelling column identifies species which are possible to occur based upon MaxENT habitat modelling (likelihood threshold > 0.33; NA represents no modelling was undertaken). Species that were possible from the modelling but not observed during standardised sampling in the New South Wales Lower Darling WRPAs were: Murray hardyhead, Flat-headed galaxias, Macquarie perch, Trout cod, Southern purple-spotted gudgeon, Flathead gudgeon, Dwarf flathead gudgeon, Freshwater catfish. It should be noted that the MaxENT modelling actually models habitat availability and is not always a reliable index of abundance, it merely indicates possible distribution based upon habitat. A list of species caught as part of standardised monitoring during this period is in Table 9.8.

Table 9.11: Total catch of each species by all sampling programs and all methods in the region. Sampling season refers to the July-June ending June 30th of the specified year. Note these include projects with sampling not representative of the community and the data should be interpreted with appropriate caution.

Common name	Expected from modelling	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Australian smelt	YES	8	50	6	172	57	352	2,113	975	757	377
Bony herring	YES	160	1,701	858	2,431	393	3,140	2,244	1,612	2,784	2,439
Carp gudgeon species complex	YES	621	225	1,380	1,898	204	2,015	2,580	983	1,003	682
Common carp	NA	60	313	239	796	238	751	25,722	19,325	3,976	879
Common carp - Goldfish hybrid	NA	0	0	0	0	0	0	0	1	0	0
Eastern gambusia	NA	16	159	71	88	4	287	651	73	552	23
Golden perch	YES	14	42	23	233	78	714	574	419	314	1,049
Goldfish	NA	48	17	10	137	5	9	19	595	606	154
Hyrtl's catfish	NO	0	0	0	0	0	0	0	0	0	1
Murray cod	YES	12	5	11	96	20	119	17	17	43	25
Murray-Darling rainbowfish	YES	0	6	0	0	0	9	3	1	1	0
Olive perchlet	YES	0	0	0	0	0	0	1	1	0	0
Redfin	YES	0	0	0	0	0	0	0	0	2	0
Silver perch	YES	0	1	0	5	1	2	2	2	5	9

(continued)

Common name	Expected from modelling	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Spangled perch	YES	0	2	0	0	0	13	11	186	61	220
Unspecked hardyhead	YES	1	4	0	0	0	1	0	0	0	0

9.14.1 References

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